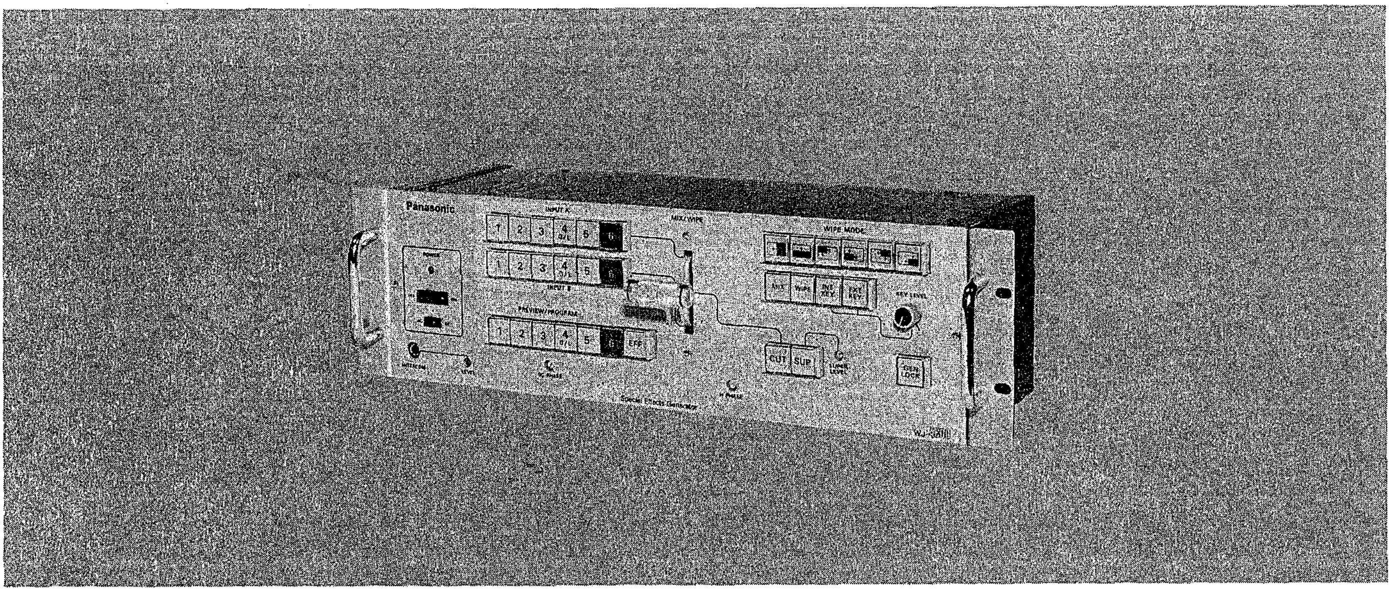
Service Manual

Special Effects Generator
WJ-4600



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Vol. 3
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Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Service Manual

Special Effects Generator

WJ-4600

Vol. 1

Circuit Description

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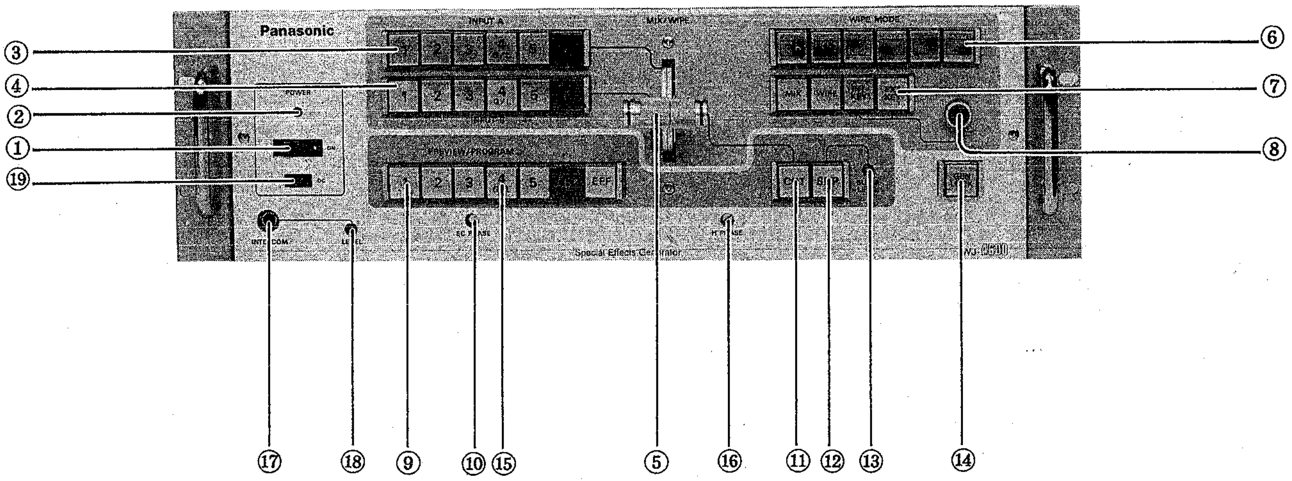
MAJOR OPERATING CONTROLS

- **FRONT VIEW**


Panasonic
INPUT A
MIX/WIPE
WIPE MODE
POWER
PREVIEW/PROGRAM
EFF
INTERCOM
LEVEL
SC PHASE
H PHASE
Special Effects Generator
③
④
②
①
⑲
⑥
⑦
⑧
⑰
⑱
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⑩
⑮
⑤
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⑪
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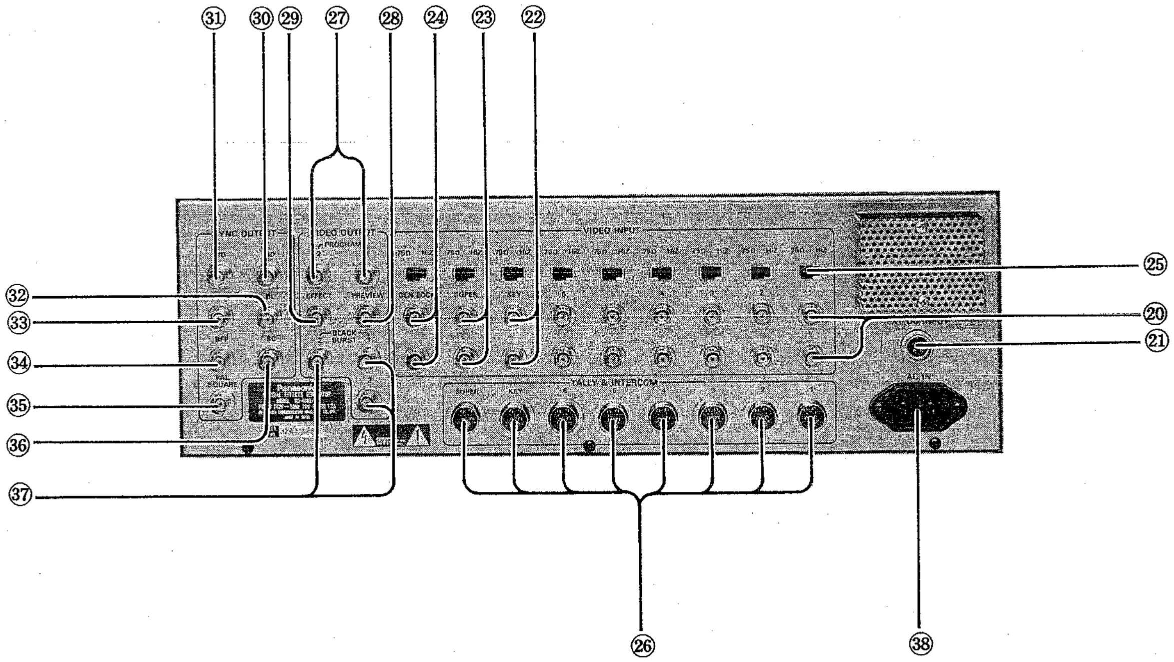
⑬
⑭

- **REAR VIEW**


SYNC OUTPUT
VIDEO OUTPUT
PROGRAM
EFFECT
PREVIEW
GEN LOCK
SUPER
KEY
VIDEO INPUT
BLACK BURST
PAL SQUARE
TALLY & INTERCOM
AC IN
㉛
㉚
㉙
㉗
㉘
㉔
㉓
㉒
㉜
㉝
㉞
㉟
㊱
㊲
㉕
⑳
㉑
㉖
(38)

CONTROLS AND THEIR FUNCTIONS

FRONT

1 **Power ON/OFF Switch (Power ON/OFF)**
Turn power ON and OFF.

2 **Power Indicator**
This lamp turns to red when the ON/OFF Switch is ON position.

3 **Input A Selector (INPUT A)**
Select any one of 6 video sources for Input A.
CAUTION: Preview monitor will show the black & white picture when the black & white signal or no signal is selected on CH A (Input A).
It is recommended that the colour signal for CH A should be selected for colour preview monitor.

4 **Input B Selector (INPUT B)**
Select any one of 6 video sources for Input B.

5 **Mix and Wipe Levers (MIX/WIPE)**
Separate or locked, dual-fader and split-screen controls.

6 **Wipe Mode Selector (WIPE MODE)**
Pushing any one of the built-in six wipe mode selectors allow variable split pictures between cameras by moving Mix and Wipe Levers ⑤

7 **Function Selector (MIX/WIPE/INT KEY/EXT KEY)**
Selects the type of special effect which is applied to the program out bus.

8 **Key Level Control (KEY LEVEL)**
Control for obtaining optimum keying.

9 **Preview/Program Selector (PREVIEW/PROGRAM)**
Cut ON/OFF switch ⑪ OFF :
Permits the preview video (1-6, EFF) to be seen on the preview monitor.
Cut ON/OFF switch ⑪ ON :
Permits the preview video (1-6, EFF) to be seen as a program monitor (line out).

10 **SC Phase Control for Gen-lock (GEN LOCK SC PHASE)**
The SC phase control is needed to match the colour hues between the gen-lock signal and the program output signal. See page 10.

11 **Cut ON/OFF Switch (CUT)**
Reverse the preview and program pictures when this switch is ON after the preview picture's is composed. The preview picture becomes the program output.

12 **Super ON/OFF Switch (SUP)**
Permit the superimposing of images to program output when the switch is ON.

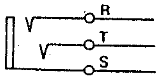
13 **Super Level Control (SUPER LEVEL)**
Control for obtaining optimum superimposed image.

14 **Gen-Lock ON/OFF Switch (GEN LOCK)**
Gen-lock video input signal should be connected to the Video Input Connector for Gen-lock ㉔
When the gen-lock signal is connected and this switch is pushed in for lighting lamp, this SEG system is synchronized with Gen-lock signal.

15 **Gen-lock Push Button (4 G/L)**
Gen-lock Switch ON:
The video signal which is connected to the Video Input Connector for Gen-lock ㉔ will be selected by depressing the No. 4 (G/L) button of input selector.
Gen-lock Switch OFF:
The video signal which is connected to the No. 4 of Video Input Connector ⑳ will be selected by depressing the No. 4 (G/L) button of input selector.

16 **Horizontal Phase Control for Gen-lock (GEN LOCK H PHASE)**
The horizontal phase difference between the gen-lock signal and the program output signal may be adjusted with this recessed control. See page 11.

17 **Intercom Jack (INTERCOM)**
For voice communications between cameras and WJ-4600.



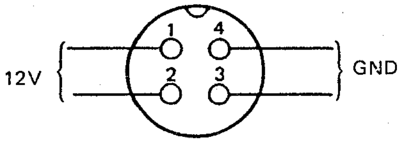
18 **Intercom Lever Control (LEVEL)**
Turn this control to have optimum receiver sound level for the headset connected to the intercom jack ⑰ .

19 **AC/DC Switch (AC/DC)**
This is AC or DC power selector switch.
Set to AC side when 220V/240V AC 50 Hz power is supplied through AC power connector ㊳
Set to DC side when 12V DC power is supplied through EXT DC INPUT ㉑ .

REAR

20 Video Input Connector (VIDEO INPUT/1 - 6)
The output of a camera remote control unit or camera should be connected to through one of these two BNC connectors. If this signal is not looped, the Video Termination Switch ㉕ should be set to 75Ω position.

21 External DC Input Connector (EXT DC INPUT)
Four pin type connector for external 12V DC 1.2A source.



22 Video Input Connector for Key (VIDEO INPUT/KEY)
The output of the key camera should be connected to one of these two BNC connectors. If this signal is not looped through, the Video Termination Switch ㉕ should be set to 75Ω position.

23 Video Input Connector for Superimposing (VIDEO INPUT/SUPER)
The output of the camera used for superimposing should be connected to one of these two BNC connectors. If this signal is not looped through the Video Termination Switch ㉕ should be set to 75Ω position.

24 Video Input Connector for Gen-lock (VIDEO INPUT/GEN-LOCK)
The output of a non-synchronous composite video source should be connected to one of these two BNC connectors. If this signal is not looped through, the Video Termination Switch ㉕ should be set to 75Ω position.

25 Video Termination Switch (VIDEO INPUT 75Ω/Hi-Z)
When bridging or looping through, set this switch to Hi-Z position. Set to 75Ω position otherwise.

26 Tally/Intercom Connector (TALLY/INTERCOM)
The audio communication tally controls between the camera systems and the SEG are introduced into this connector.

27 Program Output Connector (VIDEO OUTPUT/PROGRAM 1.2.)
Two BNC type connectors for program output signals.

28 Preview Output Connector (VIDEO OUTPUT/PREVIEW)
BNC type connector for preview output signal.
CAUTION: Preview monitor will show the black & white picture when the black & white signal or no signal is selected on CH A (Input A).
It is recommended that the colour signal for CH A should be selected for colour preview monitor.

29 Effects Output Connector (VIDEO OUTPUT/EFFECT)
BNC type connector for effects output signal.

30 Horizontal Drive Output Connector (SYNC OUTPUT/HD)
BNC type connector for HD signal.

31 Vertical Drive Output Connector (SYNC OUTPUT/VD)
BNC type connector for VD signal.

32 Blanking Output Connector (SYNC OUTPUT/BL)
BNC type connector for BL signal.

33 Sync Output Connector (SYNC OUTPUT/SYNC)
BNC type connector for SYNC signal.

34 Burst Flag Pulse Output Connector (SYNC OUTPUT/BFP)
BNC type connector for BFP signal.

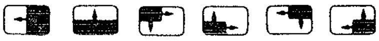
35 Pal Square Pulse Output Connector (SYNC OUTPUT/PAL SQUARE)
BNC type connector for PAL SQUARE pulse.

36 Subcarrier Output Connector (SYNC OUTPUT/SC)
BNC type connector for SC signal.

37 Black Burst Output Connector (BLACK BURST 1.2.3.)
Three black burst outputs are available by using BNC type connectors.

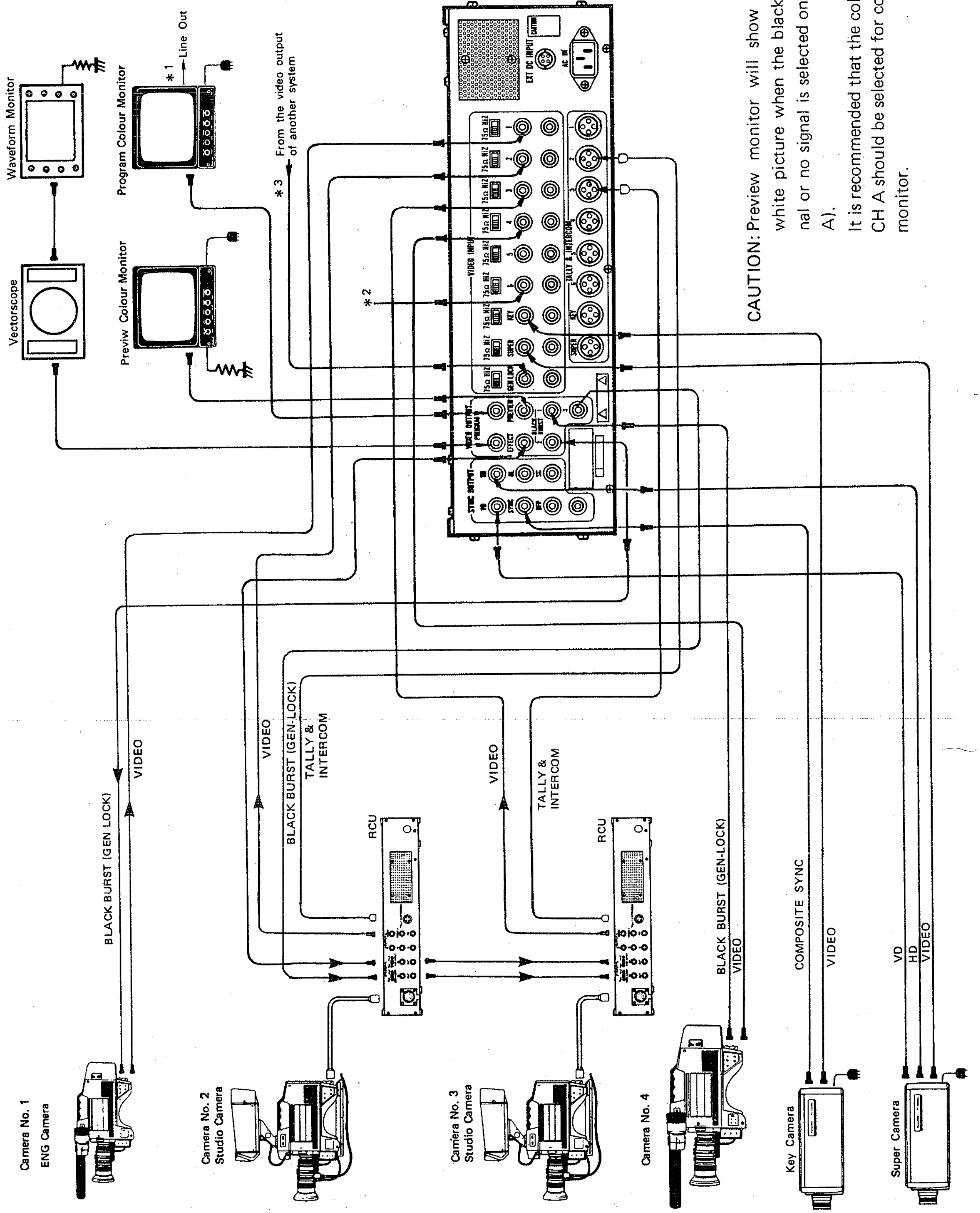
38 Power Supply Connector

SPECIFICATIONS

Video Input:	1.0Vp-p composite or 0.7Vp-p non-composite/75 ohms or Hi-Z looping through x 6 (BNC connectors)
Key Video Input:	1.0Vp-p composite or 0.7Vp-p non-composite/75 ohms or Hi-Z looping through x 1 (BNC connector)
Super Video Input:	1.0Vp-p composite or 0.7Vp-p non-composite 75 ohms or Hi-Z looping through x 1 (BNC connector)
Gen-lock Video Input:	1.0Vp-p VBS composite only/75 ohms or Hi-Z looping through x 1 (BNC connector)
Video Output (Program):	1.0Vp-p composite/75 ohms x 2 (BNC connectors)
Preview Output:	1.0Vp-p composite/75 ohms x 1 (BNC connector)
Effect Output:	1.0Vp-p composite/75 ohms x 1 (BNC connector)
Sync Output:	HD, VD, BL, SYNC, BFP, PAL SQUARE: 4.0Vp-p/75 ohms, SC:2.0Vp-p/75 ohms (BNC connectors)
Black Burst Output:	0 set up Black signal (Composite Sync, Burst: 0.3Vp-p/75 ohms) x 3 (BNC connectors)
Gen-lock Range:	Sync: 15.625kHz ± 120Hz SC: 4.43361875MHz ± 100Hz
Switch:	Illuminated, non-locking type (input buses, preview/program buses) and lock-release type
Switching:	Vertical interval switching (input buses, preview/program buses)
Frequency Response:	10MHz $^{+1}_{-3}$dB
Gain:	Unity
Signal to Noise Ratio:	More than 60dB
Differential Gain:	Less than 2% at 10–90% APL
Differential Phase:	Less than 2° at 10–90% APL
Crosstalk:	Better than 42dB at 4.43MHz
Functions:	
Input Bus:	Input A and B (camera 1–3, 4 or gen-lock video, 5, 6 or black)
Preview/Program Bus:	Camera 1–3, 4 or gen-lock video, 5, 6 or black, Effect
Effects:	
Fading:	Yes
Dissolves:	Yes
Superimposing:	Yes
Wipes:	Normal-reverse modes; with six patterns:
	
Internal Key:	Yes
External Key:	Yes
Gen-lock:	Yes
Tally Light Control:	8 (camera 1–6), key camera, super camera)
Intercom:	7 (camera 1–6, self)
Power Source:	12V DC 1.2A or 240V AC 50Hz: WJ-4600/A, WJ-4600/B or 220V AC 50Hz: WJ-4600/C, WJ-4600/G
Power Consumption:	26W
Ambient Temperature:	-10°C–+50°C (14°F–122°F)
Ambient Humidity:	Less than 90%
Dimensions:	19"(W) x 5-1/4"(H) x 8-13/16" (D) 480 (W) x 130 (H) x 224 (D) mm
Weight:	14-1/6 lbs, 6.4kg

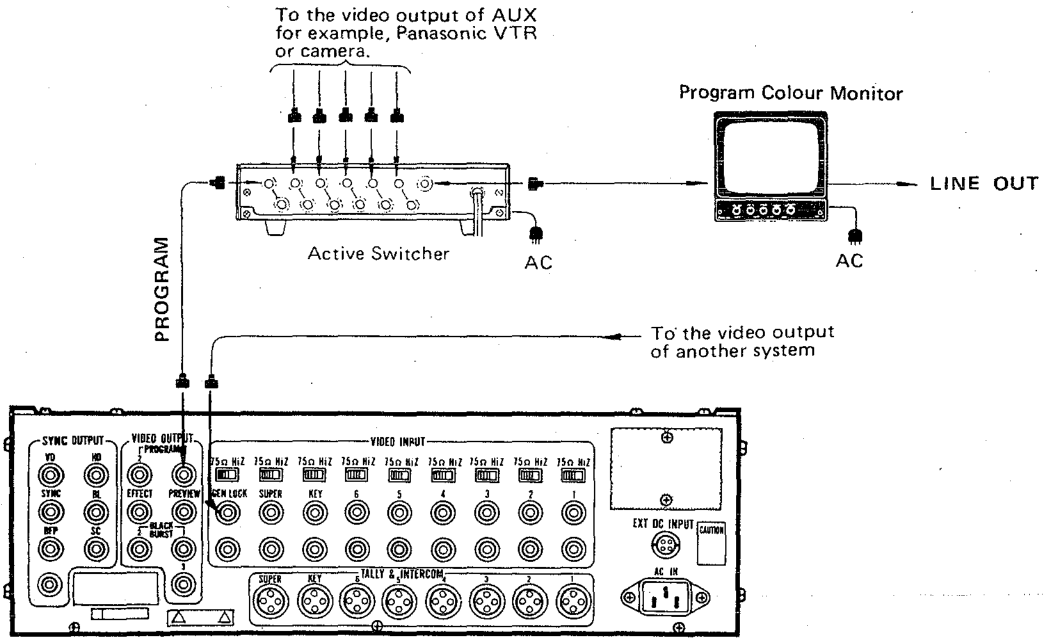
* Specifications are subject to change without notice.
Weights and dimensions shown are approximates.

SYSTEM CONNECTION


Waveform Monitor
Vectorscope
Program Colour Monitor
Previw Colour Monitor
＊1
Line Out
＊3
From the video output of another system
＊2
EXT DC INPUT
AC IN
CAUTION
VIDEO INPUT
75Ω HiZ
1
2
3
4
5
6
KEY
SUPER
GEN LOCK
TALLY & INTERCOM
VIDEO OUTPUT
PROGRAM
PREVIEW
EFFECT
BLACK BURST
SYNC OUTPUT
VD
HD
SC
SYNC
BFP
BLACK BURST (GEN LOCK)
VIDEO
BLACK BURST (GEN-LOCK)
TALLY & INTERCOM
RCU
COMPOSITE SYNC
Camera No. 1
ENG Camera
Camera No. 2
Studio Camera
Camera No. 3
Studio Camera
Camera No. 4
Key Camera
Super Camera

CAUTION: Preview monitor will show the black & white picture when the black & white signal or no signal is selected on CH A (Input A).
It is recommended that the colour signal for CH A should be selected for colour preview monitor.

* 1 System application with AUX video inputs


To the video output of AUX
for example, Panasonic VTR
or camera.
Program Colour Monitor
LINE OUT
Active Switcher
AC
AC
PROGRAM
To the video output
of another system
SYNC OUTPUT
VD
HD
SYNC
BL
BFP
SC
VIDEO OUTPUT
PROGRAM
2
EFFECT
PREVIEW
BLACK BURST
2
1
3
VIDEO INPUT
75Ω HiZ
GEN LOCK
SUPER
KEY
6
5
4
3
2
1
TALLY & INTERCOM
SUPER
KEY
6
5
4
3
2
1
EXT DC INPUT
CAUTION
AC IN

* 2 NO.6 Video Input Connector

When using Fade in/Fade-out, do not use this connector.

* 3 Gen-lock

Video input signal should be composite. Other video input signal may be either composite or non-composite.

SET UP PROCEDURE

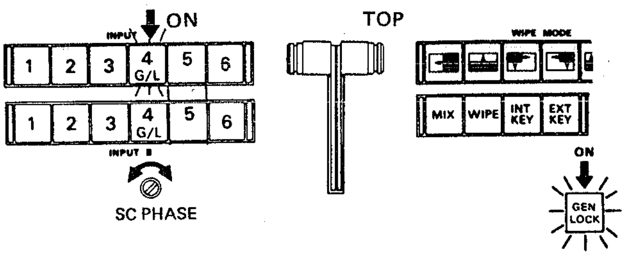
- Connect the units as shown in the system connection diagram in page 7.
- Supply colour bar signal to Gen-Lock input connector ㉔.

■ GEN-LOCK

1. SC Phase Adjustment of Gen-Lock

- **Procedure by using Vectorscope**

1) Connect the program output signal ㉗ to vectorscope.
2) Select the No. 4 button on the Input A Selector ③ and set the Mix and Wipe levers ⑤ at top position. Then, depress the Gen-lock ON/OFF Switch ⑭ to ON position.

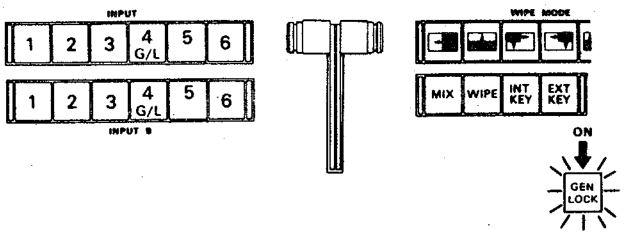

ON
INPUT
1
2
3
4 G/L
5
6
INPUT B
SC PHASE
TOP
WIPE MODE
MIX
WIPE
INT KEY
EXT KEY
ON
GEN LOCK

3) Then, adjust the SC Phase ⑩ so that the chroma vectors of the program signal go into the ⊞ of vectorscope.

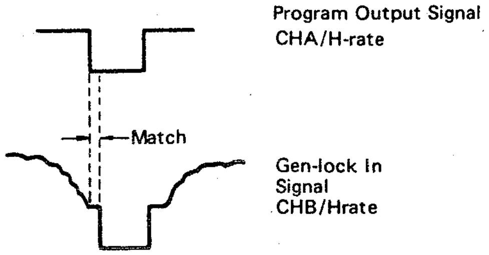
2. H Phase Adjustment of Gen-Lock

- **Procedure by using dual oscilloscope**

1) Connect CH A of oscilloscope at the Program Output Connector ㉗ and also connect CH B of oscilloscope at the Gen-lock Input Connector ㉔ .
2) Depress the Gen-lock ON/OFF Switch ⑭ to ON position and lamp lights when the gen-lock signal is connected.


INPUT
1
2
3
4 G/L
5
6
INPUT B
WIPE MODE
MIX
WIPE
INT KEY
EXT KEY
ON
GEN LOCK

3) Observe the waveform on the oscilloscope as;


Program Output Signal CHA/H-rate
Match
Gen-lock In Signal CHB/Hrate

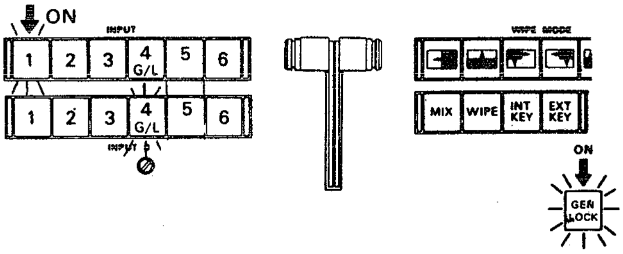
4) Adjust the H Phase Control for the Gen-lock ⑯ to match the sync of both signals.

■ SYSTEM CAMERA

1. SC Phase Adjustment of System Camera

- **Set up procedure**

1) Select the No. 1 button on the Input A Selector ③ and No. 4 button on the Input B Selector ④. Then, depress the Gen-lock ON/OFF Switch ⑭ to ON position.


ON
INPUT
1
2
3
4 G/L
5
6
INPUT B
WIPE MODE
MIX
WIPE
INT KEY
EXT KEY
ON
GEN LOCK

2) Select the vertical wipe ▄ mode on the Wipe Mode Selector ⑥ , Wipe mode on the function selector ⑦ and set the Mix and Wipe levers ⑤ at middle position.

1 VIDEO CROSSPOINT-1 BOARD

This board selects a camera input A (B), and snds that camera input signal to the next board WIPE/MIX/KEY BOARD. (VIDEO CROSSPOINT-1 BOARD is used for INPUT A and INPUT B)

1-1 VIDEO CROSSPOINT CIRCUIT (TR1 ~ TR 12)

TR1~TR12 constitute an INPUT A (B) bus switching circuit.

Normally, TR1 to TR12 are cut off.

When an INPUT A (B) selector button is depressed, a switching pulse is applied to the appropriate vertical interval switching circuit (called V.I.S.) IC3. As a result, the corresponding transistor (TR1, TR3, TR5, TR7 TR9 and TR11) is energized, allowing the input video signal to pass to the output.

Fig. 1 IC3 TRUTH TABLE

INPUTS			OUTPUT
Clock	Data	Reset	Q
_⌐‾	0	1	0
_⌐‾	1	1	1
‾¬_	x	1	Q (No change)
x	x	0	0

1-2 VERTICAL INTERVAL SWITCHING (V.I.S) CIRCUIT (IC3)

The V.I.S. circuit permits video input switching to take place only during vertical blanking. Thus noise generated by switching transients will not be displayed on the monitor. The circuitry works in the following way.

When an INPUT A (B) selector button is depressed, a high pulse is sent to the D input of the corresponding D type flip-flop IC3 section.

A D-type flip-flop waits for the presence of a clock pulse, and examines the state (high or low) of its input (D) during the clock pulse. It then forces the output (Q) to assume the same state as its input D.

No change can occur without the clock pulse.

The clock pulse is applied to pin No. 12 of IC4, (an AND gate) where it will either be blocked, or will pass to the clock inputs of D flip-flops depending on the input state of pin No. 13 of IC4. Suppose no INPUT A (B) selector button is depressed, then a low will be present on pin No. 13 of IC4, creating a low output.

When an INPUT A (B) selector button is pushed, a high pulse is sent to pin No. 13 of IC4, and clock pulses are passed to all D flip-flops. Even after the button is released, these Q output states will remain, because

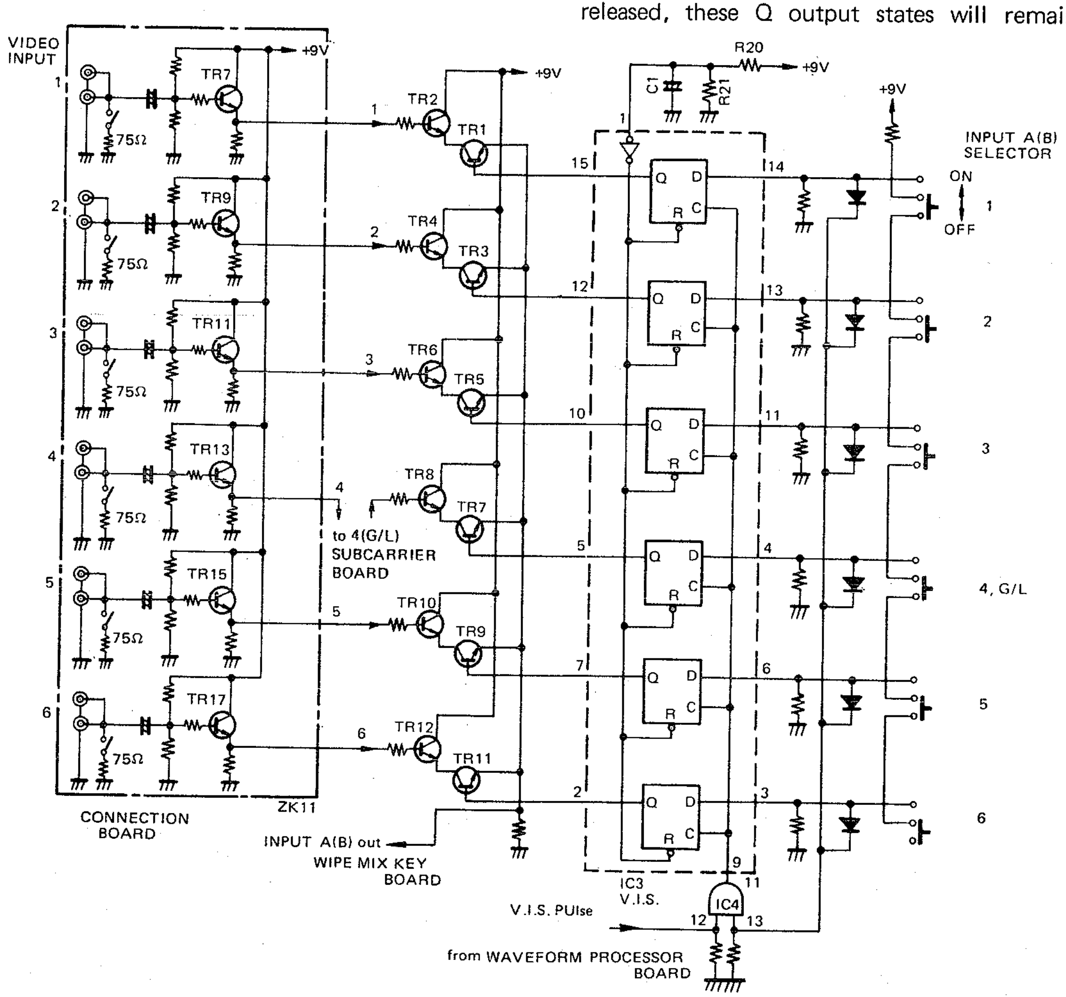

VIDEO INPUT
1
2
3
4
5
6
75Ω
TR7
TR9
TR11
TR13
TR15
TR17
+9V
TR2
TR1
TR4
TR3
TR6
TR5
TR8
TR7
TR10
TR9
TR12
TR11
to 4(G/L) SUBCARRIER BOARD
CONNECTION BOARD
ZK11
INPUT A(B) out
WIPE MIX KEY BOARD
R20
C1
R21
Q D
R C
15
12
10
5
7
2
14
13
11
4
6
3
9
IC3 V.I.S.
IC4
V.I.S. PUlse
from WAVEFORM PROCESSOR BOARD
INPUT A(B) SELECTOR
ON
OFF
4, G/L

Fig. 2 Video Cross Point Circuit

clock pulses can only be passed while a button is depressed. It will require pressing a different button to change the flip-flop states.

Whenever the power is turned on, a reset (low) pulse is momentarily sent to each flip-flop, forcing all Q's to initially be low. This is created by C1 due to the time constant it takes this capacitor to charge through R20. Since all Q's are low, all video inputs are locked out initially.

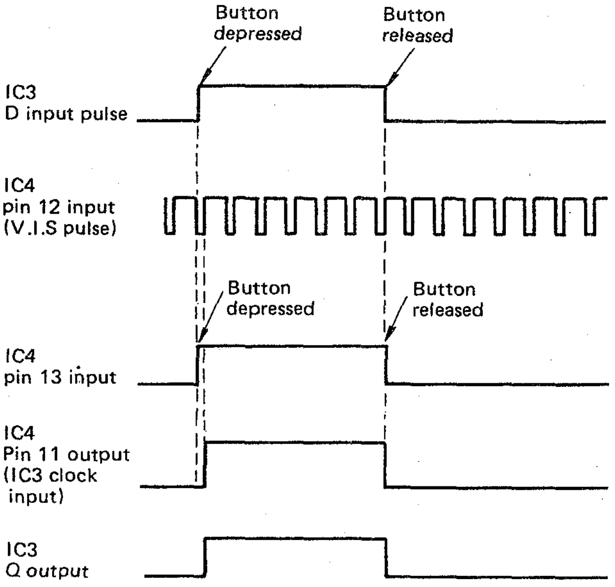


Fig. 3 Vertical Interval Switching

1-3 LAMP MATRIX CIRCUIT (TR15 ~ TR21)

When an INPUT A (B) selector button is depressed, a high switching pulse is applied to the appropriate V.I.S. circuit IC3.

As a result, the corresponding transistor (TR15~TR20) is turned ON, causing the indicator lamp to light. When TR21 is turned OFF the indicator lamp is half dimmed due to the voltage drop across R37. This occurs:

1) When the CUT button is ON and the output of IC4 is low.

2) When the MIX/WIPE button is ON and MIX/WIPE lever is at the top position, A LIMIT SWITCH is on, causing the INPUT B indicator lamp to dim.

3) When the MIX/WIPE button is ON and MIX/WIPE lever is at the bottom position, B LIMIT SWITCH is on, causing the INPUT A indicator lamp to dim.

4) When the SUPER button is ON and MIX/WIPE lever is at the top position, A LIMIT SWITCH is on, causing the INPUT B indicator lamp to dim.

5) When the SUPER button is ON and MIX/WIPE lever is at the bottom position, B LIMIT SWITCH is ON, causing the INPUT A indicator lamp to dim.

When the INT KEY or EXT KEY button is ON, the low signal of the KEY TALLY CONT turns TR14 OFF, causing the indicator lamp can not be light weakly.

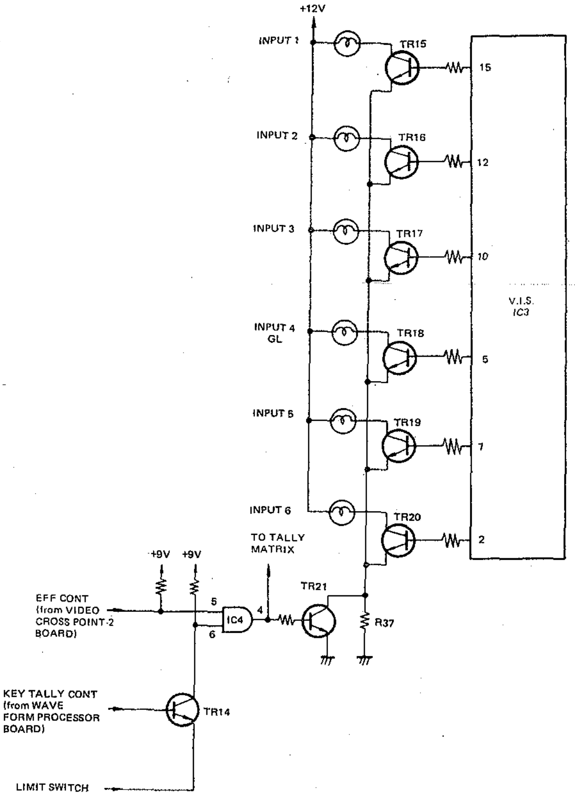

+12V
INPUT 1
TR15
15
INPUT 2
TR16
12
INPUT 3
TR17
10
V.I.S. IC3
INPUT 4 GL
TR18
5
INPUT 5
TR19
7
INPUT 6
TR20
2
TO TALLY MATRIX
+9V
+9V
EFF CONT (from VIDEO CROSS POINT-2 BOARD)
5
IC4
4
6
TR21
R37
KEY TALLY CONT (from WAVE FORM PROCESSOR BOARD)
TR14
LIMIT SWITCH

Fig. 4 Lamp Matrix Circuit

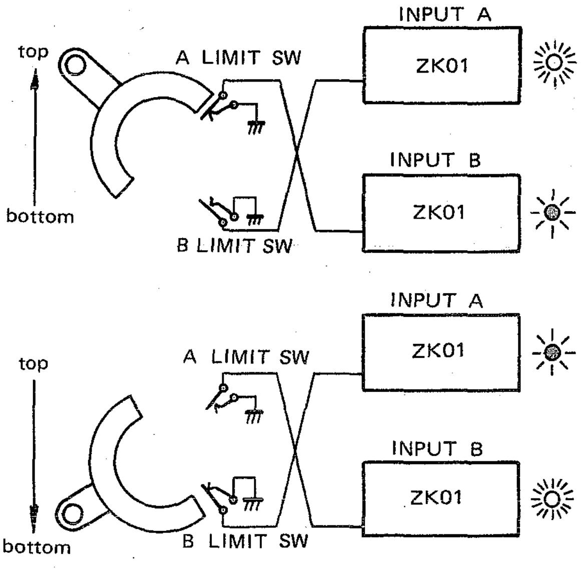

INPUT A
top
A LIMIT SW
ZK01
INPUT B
bottom
ZK01
B LIMIT SW
INPUT A
top
A LIMIT SW
ZK01
INPUT B
ZK01
bottom
B LIMIT SW

Fig. 5 Lamp Matrix

1-4 TALLY MATRIX CIRCUIT (IC1 ~ IC4)

The tally switching transistors on CONNECTION BOARD provide the ground for the appropriate tally lamps.

If the inputs of an AND gate are high (determined by the Q output state of the IC3 to which it is connected, and output state of Pin No. 4 of IC4, Tally 4 CONT signal and TALLY 5 CONT), then the tally lamp connected to transistor (on the connection bd) meeting these conditions will light.

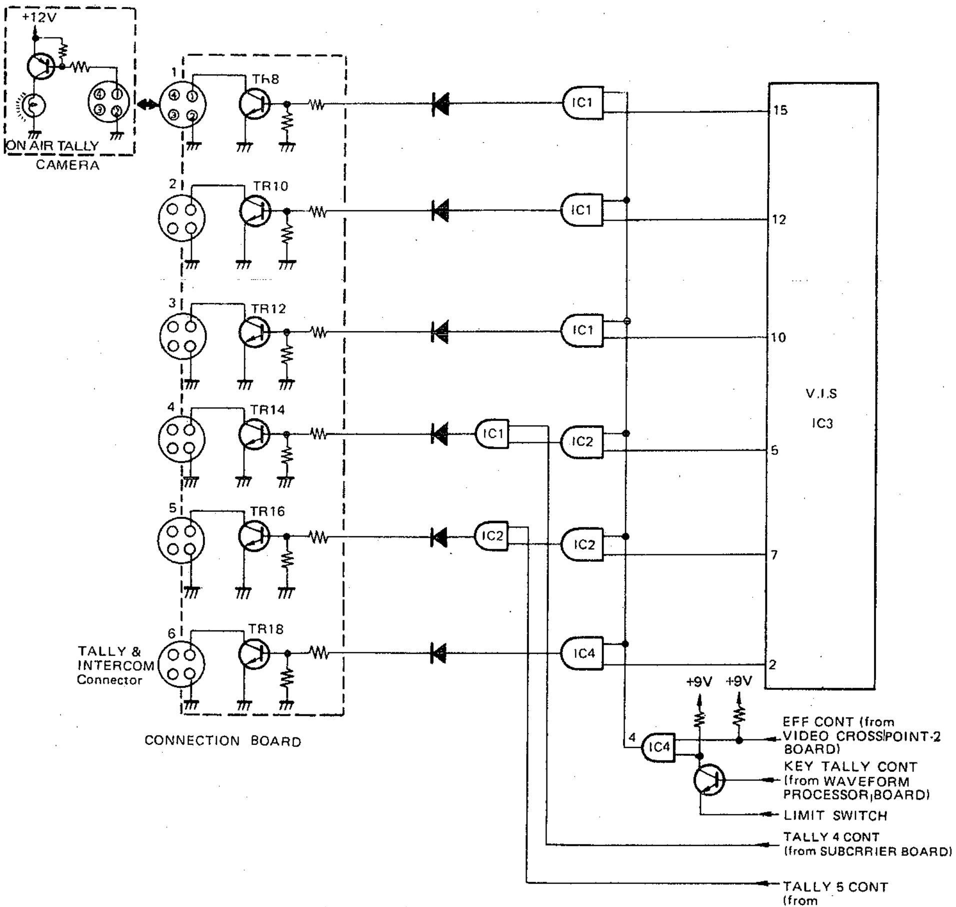

+12V
ON AIR TALLY
CAMERA
1
TR8
2
TR10
3
TR12
4
TR14
5
TR16
6
TR18
TALLY & INTERCOM Connector
CONNECTION BOARD
IC1
IC1
IC1
IC1
IC2
IC2
IC2
IC4
IC4
4
15
12
10
5
7
2
V.I.S
IC3
+9V
+9V
EFF CONT (from VIDEO CROSSPOINT-2 BOARD)
KEY TALLY CONT (from WAVEFORM PROCESSOR BOARD)
LIMIT SWITCH
TALLY 4 CONT (from SUBCRRIER BOARD)
TALLY 5 CONT (from BOARD)

Fig. 6 Tally Matrix Circuit

2 WIPE/MIX/KEY BOARD

This circuit board combines Input A and Input B signals according to MIX, WIPE and KEY functions to make EFF OUT signal and supplies EFF OUT signal to PREVIEW/EFFECT OUTPUT BOARD.

2-1 MIX MODE

The video signal selected by VIDEO CROSS POINT-1 BOARD (INPUT A) is clamped by TR1 and enters pin No. 1 of the differential amplifier IC1 via buffer (TR2 TR3).

Also the video signal selected by VIDEO CROSS POINT-1 BOARD (INPUT B) is clamped by TR8 and enters pin No. 1 of IC3 via buffer (TR9, TR10).

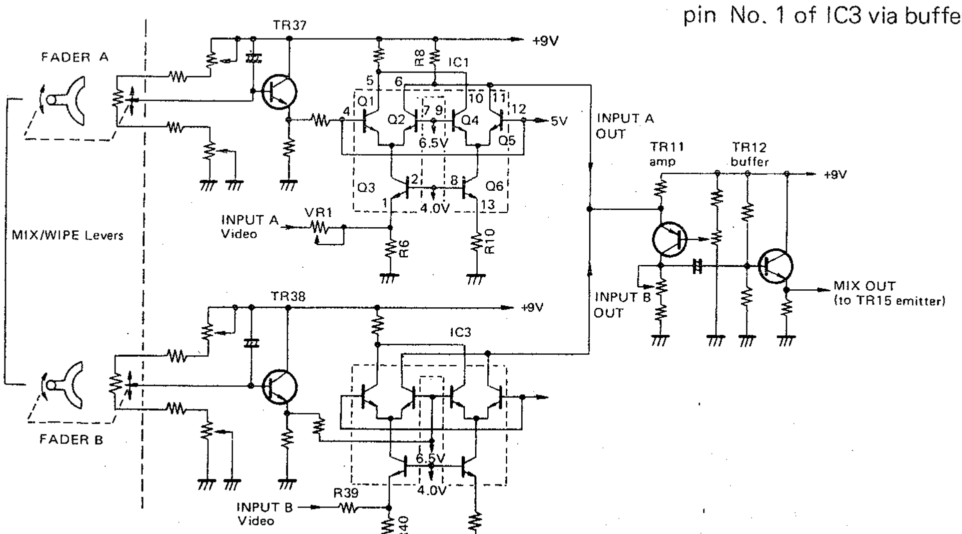

FADER A
MIX/WIPE Levers
FADER B
TR37
+9V
R8
IC1
5
6
10
11
12
4
Q1
Q2
7
9
Q4
Q5
-5V
6.5V
Q3
2
8
Q6
1
13
4.0V
INPUT A Video
VR1
R6
R10
INPUT A OUT
TR11 amp
TR12 buffer
+9V
INPUT B OUT
MIX OUT (to TR15 emitter)
TR38
+9V
IC3
6.5V
4.0V
R39
INPUT B Video
R40

Fig. 7 Mixing Circuit

IC1 and IC3 function in a similar manner so that the operation of IC1 only will be described.

IC1 consists of six transistors, Q1~Q6, which form two differential amplifiers. One is formed by Q1~Q3, and the other is formed by Q4~Q6.

The base of Q3 is held at +4V. Therefore the emitter will be a constant voltage of approximately 3.3V regardless of the magnitude of the incoming video signal. The voltage acorss R6 is constant. Therefore the current flowing through R6 is also constant. This current, iR6, is a combination of the constantly changing current from the input A video signal (Δi1) plus the current which flows through Q3 (iQ3).

$$iQ3 + \Delta i1 = iR6$$

Therefore $iQ3 = iR6 - \Delta i1$

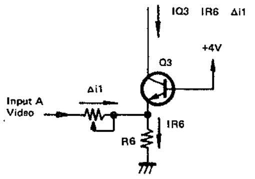


Fig. 8

Thus the current flowing in Q3 (iQ3) is constantly changing according to the video signal, in order to maintain constant current through R6. (Note: The current flowing from base to emitter in Q3 is ignored in this analysis because the current gain of Q3 is assumed to be sufficiently high.)

iQ3 is in turn the sum of the current flowing in Q1 (iQ1) plus the current flowing in Q2 (iQ2).

$$iQ3 = iQ1 + iQ2$$

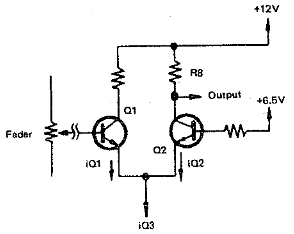


Fig. 9

The output of this stage is taken at the collector of Q2. This output is directly proportional to iQ2 which can be changed with the fader voltage at the base of Q1. Suppose the fader voltage is set as low as possible (5V). Then Q1 will be completely shut off and iQ1 is zero.

Therefore $iQ2 = iQ3 = iR6 - \Delta i1$

The factor of Δi1 represents the video information which entered at the emitter of Q3. At this point the magnitude of Δi1 is unchanged and only a constant bias factor (iR6) has been added. Thus the signal gain under this condition is one. Suppose the fader voltage is set as high as possible (8V). Then Q1 is turned on fully and iQ1 is equal to iQ3. Therefore iQ2 is zero and the Δi1 factor at the collector of Q2 also becomes zero. Thus the signal gain under this condition is zero.

Now suppose the fader voltage is set to the center of its range (4V). The bias to the base of Q1 is exactly the same as the bias to the base of Q2.

Therefore: $iQ1 = iQ2$

since $iQ3 = iQ1 + iQ2$

Therefore

$$iQ2 = \frac{iQ3}{2}$$

and $iQ2 = \frac{iR6}{2} - \frac{\Delta i1}{2}$

Thus the gain of the video signal (Δi1 factor) has been reduced to one-half by setting the fader lever to the center. In this manner, the gain of the video signal can be varied from zero to one by changing the setting of the fader lever.

Unfortunately, this signal (iQ2) can not directly be utilized because the bias (iR6 factor) changes along with the video signal (Δi1 factor) as the fader lever is moved. For example, suppose no video signal is applied and the fader lever is varied. Then the output bias will change, which will be interpreted as a change of signal, even through no video signal was applied.

A second differential amplifier (Q4~Q6) has been shunted across the output of the first. Its gain is also determined by the fader voltage and it inserts current bias in a manner opposite to the first differential amplifier. The result is that output bias remains constant regardless of fader voltage, so that only the video signal magnitude changes as the fader is moved. This is accomplished in the following manner.

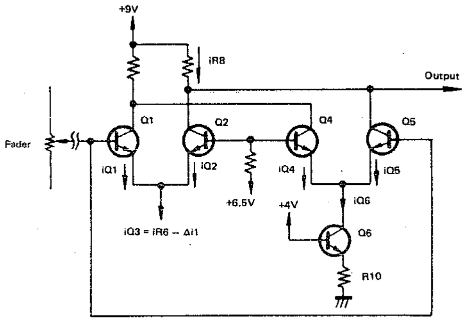


Fig. 10

Q4~Q6 have been added. The current flowing through Q6 (iQ6) is exactly the same as the current flowing through Q3 when no video signal is applied to Q3. The bias applied to Q6 is exactly the same as the bias applied to Q3. Since no video signal is applied to Q6, iQ6 consists only of bias current which is equal to the bias current factor within iQ3. In other words:

$$iQ6 = iR6$$

In addition, since the current flowing in Q6 is the sum of the currents from Q4 and Q5 then:

$$iQ6 = iQ4 + iQ5$$

Now, with the extra stage added, let's examine what happens to the output signal as the fader lever is varied.

The output signal results from the current flowing through R8 (iR8), which in turn is the sum of current flowing through Q2 plus the current flowing through Q5.

$$iR8 = iQ2 + iQ5$$

Suppose the fader voltage is set as low as possible. We have previously calculated iQ2 under this condition.

$$iQ2 = iR6 - \Delta i1$$

Q5 is now shut off, so iQ5 is zero,

Therefore: $iR8 = iQ2 = iR6 - \Delta i1$

Suppose the fader voltage is set as high as possible. We already know that iQ2 is zero.

Q5 is now fully turned on.

Therefore $iQ5 = iQ6 = iR6$

Since $iR8 = iQ2 + iQ5, iR8 = 0 + iR6$

The final condition is with the fader voltage set to the center. We know iQ2.

$$iQ2 = \frac{iR6}{2} - \frac{\Delta i1}{2}$$

Q5 and Q4 are now conducting equally well, so iQ5=iQ4.

Therefore; $$iQ5 = \frac{iQ6}{2} - \frac{iR6}{2}$$

Now we can calculate iR8 under this condition.

$$iR8 = iQ2 + iQ5$$
$$= \frac{iR6}{2} - \frac{\Delta i1}{2} + \frac{iR6}{2}$$

Therefore
$$iR8 = iR6 - \frac{\Delta i1}{2}$$

With this extra stage added, there is now always a constant amount of bias (iR6) regardless of the fader lever. Only the video signal magnitude (Δi1) changes, since the video gain alone can be varied.

The signals from channel A bus going through IC1 and channel B bus going through IC3 are combined (mixed in proportion dictated by fader levers) in the emitter of TR11 after which the signal is passed through TR12 buffer to MIX/WIPE switch consisting of TR15 (and TR16). A positive going blanking gate pulse is applied to the IC2 control inputs pin No. 4 and pin No. 12. While the blanking gate is positive, only sync signal of INPUT A is applied to the output. For the rest of time only the mixed video signal is applied to the output.

2-2 WIPE MODE

The output of MIX/WIPE control signal becomes low which turns TR16 ON when the WIPE button is depressed.

The INPUT A signal and INPUT B signal after being clamped and buffered are then supplied to IC2.

The WIPE signal generated by WAVEFORM GENERATOR BOARD is applied to the IC2 control inputs at pin No 4 and pin No. 12. While the WIPE signal is positive only the INPUT A is allowed to pass to the output. For the rest of time only the INPUT B goes to the output.

2-3 KEY MODE

TR21 serves as a switching transistor allowing the video signal selected by VIDEO CROSS POINT-1 BOARD (INPUT B) to pass to the Key Slice Circuit (TR24 ~ TR26) when the INT KEY button is depressed. (TR21 is turned ON by a high signal from INT/EXT KEY CONT.) TR22 serves as a switching transistor allowing the Ext Key video signal to pass to the Key Slice Circuit when the EXT KEY button is depress. (TR22 is turned ON by a low signal from INT/EXT KEY CONT')

The KEY ON/OFF CONT signal is high when the INT KEY or EXT KEY button is depressed, allowing the Key signal to pass to the NAM Circuit consisting of TR31 and TR32.

The INPUT A signal and INPUT B signal are supplied to IC2. Key signal is applied to the IC control inputs at pin No. 4 and pin No. 12 of IC2. While the Key signal is positive, only A signal is allowed to pass to the output. For the rest of time only the B goes to the output. The output of IC2 is amplified by TR6 and supplied to Preview Effect Output Board via buffer TR7.

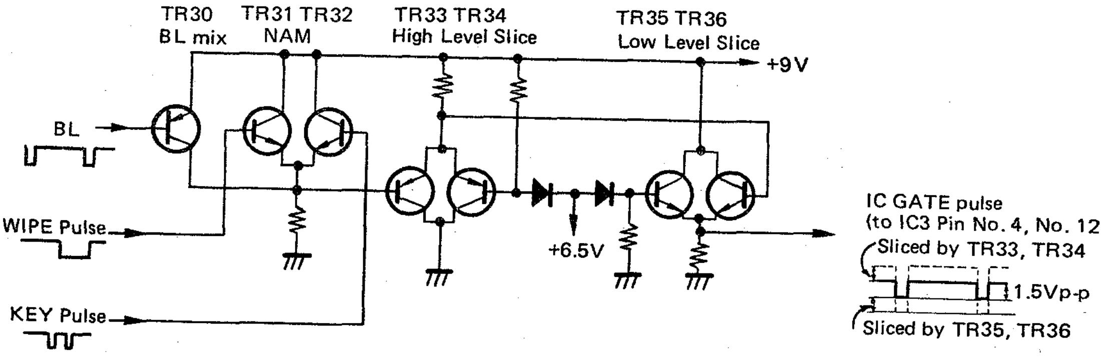


Fig. 11 Key Circuit

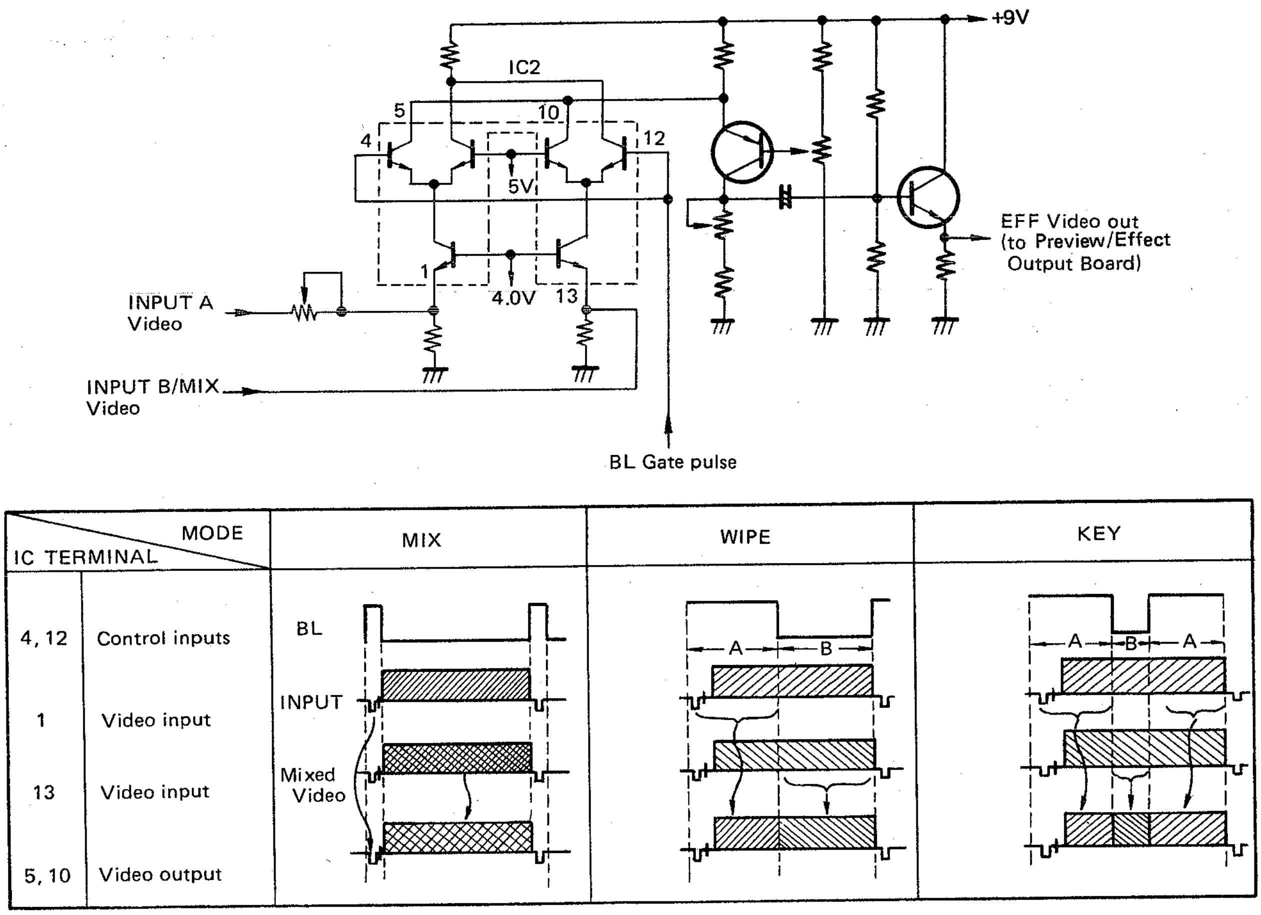

+9V
IC2
5
10
4
12
5V
1
4.0V
13
INPUT A
Video
INPUT B/MIX
Video
BL Gate pulse
EFF Video out
(to Preview/Effect
Output Board)
MODE
IC TERMINAL
MIX
WIPE
KEY
4, 12
Control inputs
1
Video input
13
Video input
5, 10
Video output
BL
INPUT
Mixed
Video
A
B
A
B
A

Fig. 12 Wipe/Mix/Key Circuit

3 VIDEO CROSS POINT-2 BOARD

This board selects a PREVIEW/PROGRAM video (1~6, EFF), and sends that signal to the PREVIEW/EFFECT OUTPUT BOARD.

3-1 VIDEO CROSS POINT CIRCUIT (TR1~TR13)

3-2 V.I.S. CIRCUIT (IC1)

Similar to VIDEO CROSS POINT-1 BOARD

3-3 CUT CONTROL CIRCUIT

When the CUT button is in the OFF position, the D input of IC4a is high, it's Q output is high, causing TR15 to turn ON and TR23 to turn OFF, reducing the indicator lamp brightness due to a voltage drop across R42 current limiter resister.

When the CUT button is in the ON position, the D input of IC4a is low, it's Q output is low, keeping TR23 turned ON. In this case the current limiter R42 is bypassed by TR23, allowing the indicator lamp to light up at full brightness.

The CUT CONTROL signal is low when the CUT and EFF buttons are both OFF but if the EFF button is depressed, the $\overline{Q}$ output of IC4b charges to low at the next vertical interval. Then the CUT CONTROL signal turns high, and this high signal is supplied to switching transistor TR5/TR6 to invert the PREVIEW OUT signal on PREVIEW/EFFECT OUTPUT BOARD.

The EFF CONTROL signal is high when the CUT and EFF buttons are OFF but if the CUT button is depressed, the Q out of IC4a changes to low at the next vertical interval. Then the EFF CONTROL signal turns low, and this low signal is supplied to switching transistor TR7/TR8 to invert the PROGRAM OUT signal on PREVIEW/EFFECT OUTPUT BOARD.

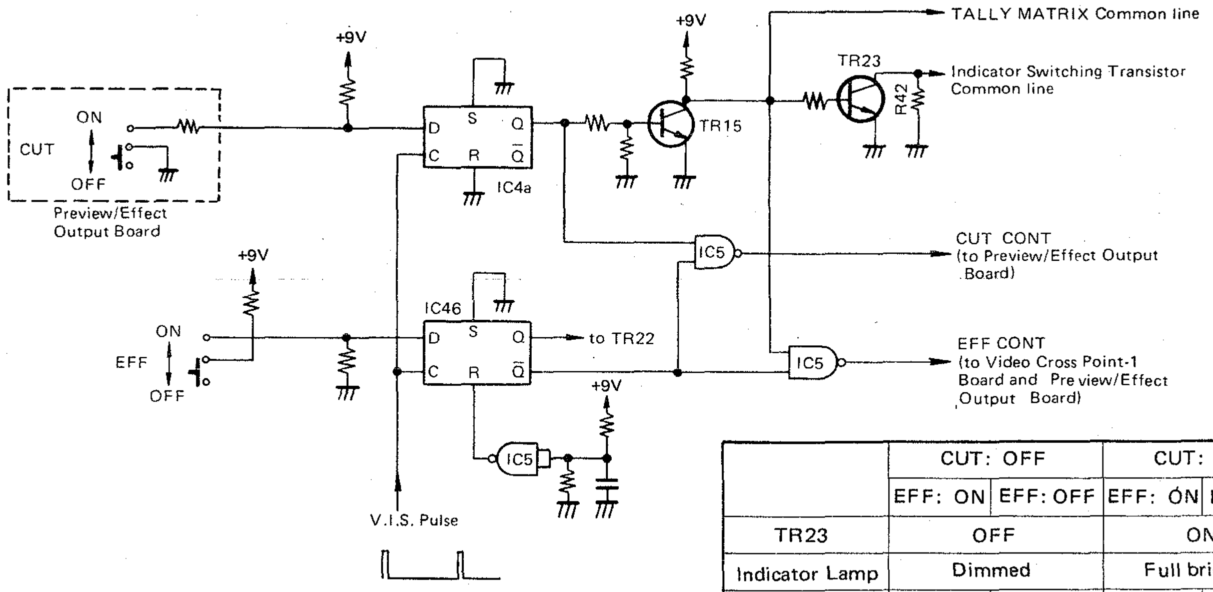

+9V
+9V
+9V
+9V
TALLY MATRIX Common line
TR23
Indicator Switching Transistor Common line
R42
ON
CUT
OFF
Preview/Effect Output Board
D S Q
C R Q̄
IC4a
TR15
IC5
CUT CONT (to Preview/Effect Output Board)
IC46
ON
EFF
OFF
to TR22
IC5
EFF CONT (to Video Cross Point-1 Board and Preview/Effect Output Board)
IC5
V.I.S. Pulse

Fig. 13 Cut Control Circuit

H: High level
L: Low level

	CUT: OFF		CUT: ON	
	EFF: ON	EFF: OFF	EFF: ON	EFF: OFF
TR23	OFF		ON	
Indicator Lamp	Dimmed		Full brightness	
CUT CONTROL	H	L	H	H
EFF CONTROL	H	H	H	L

4 WAVEFORM GENERATOR BOARD

This circuit board generates 6 different wipe pattern signal and applies to WIPE/MIX/KEY BOARD. (ZK02).

4-1 H-SAWTOOTH GEN (TR15 ~ TR20)

Incoming positive HD is differentiated by C10 and R34, and amplified by TR15.

TR15 is turned on for the duration of the negative differentiated pulses which cause C12 rapidly discharge. After TR15 turns off, C12 slowly charges in a sawtooth pattern. This sawtooth is applied to the base of TR18. The same pattern at lower impedance appears at emitter. TR19 inverts the polarity of the sawtooth waveform. Thus non-inverted and inverted sawtooth waveforms are obtained.

VR3 serves as a sawtooth amplitude adjustment.

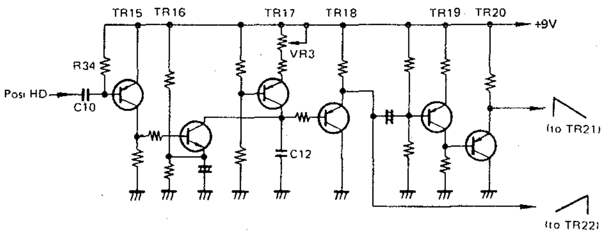

TR15
TR16
TR17
TR18
TR19
TR20
+9V
VR3
R34
Posi HD
C10
C12
(to TR21)
(to TR22)

Fig. 14 H. Sawtooth Generator

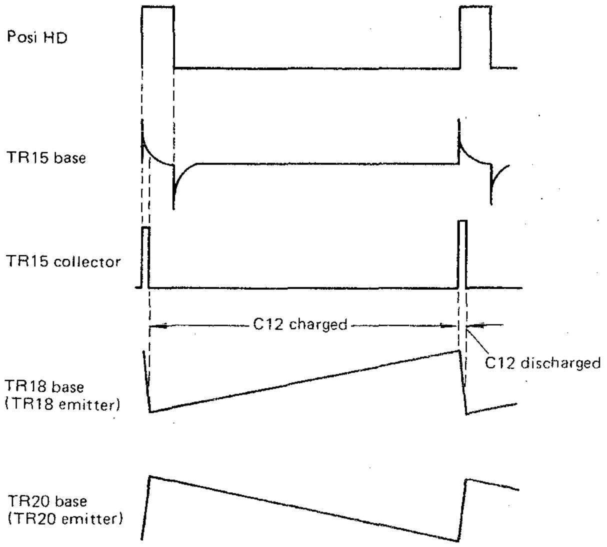


Fig. 15 H. Sawtooth

4-2 V-SAWTOOTH GEN (TR1 ~ TR6)

It is similar to H-SAWTOOTH GEN.

4-3 H-WAVEFORM SELECTOR (TR21, TR22, TR24)

The non-inverted H sawtooth waveform is sent to switch TR22, and the inverted H sawtooth waveform is sent to switch TR21. The resulting waveform polarity depends upon which transistor is on and which one is off. These transistors (TR21, TR22) are controlled by WIPE mode selector switch.

TR24 is a delete switching circuit controlled by WIPE mode selector sw ▄ which is closed during a wipe requiring no H-waveform, thereby causing the base of TR24 to be low, TR24 is turned on, thus causing the H waveform to be cut off.

4-4 V-WAVEFORM SELECTOR (TR7, TR8, TR10)

It is similar to H-WAVEFORM SELECTOR.

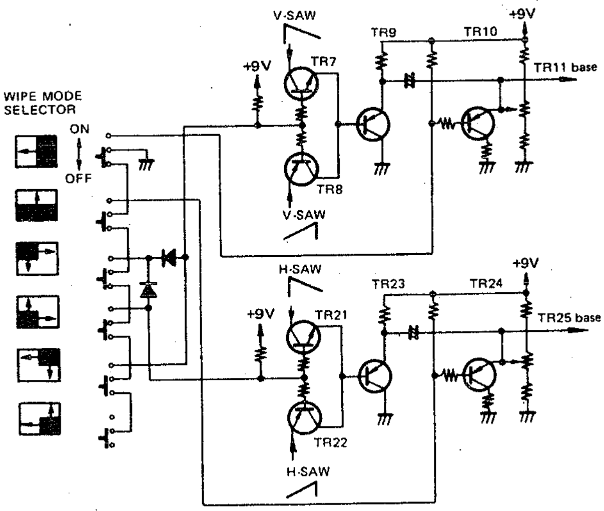

V-SAW
+9V
TR9
TR10
+9V
TR7
TR11 base
WIPE MODE SELECTOR
ON
OFF
TR8
V-SAW
H-SAW
+9V
TR23
TR24
+9V
TR21
TR25 base
TR22
H-SAW

Fig. 16 Waveform Selector Circuit

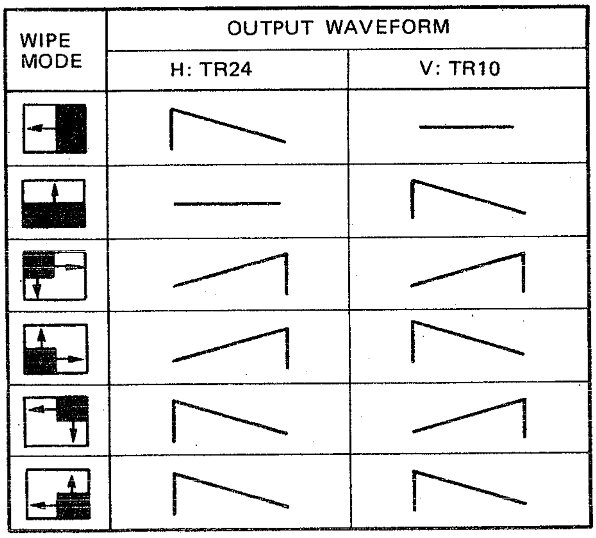

WIPE MODE
OUTPUT WAVEFORM
H: TR24
V: TR10

Fig. 17 Waveform Selection

4-5 H-WAVEFORM PROCESSOR (TR25 ~ TR27)

This circuit takes the H waveform derived according to the WIPE mode selected, and combines it with the H wipe control voltage to create a square wave.

The H waveform signal enters TR25 and base bias is added by VR4.

The base voltage of TR26 is depends upon H wipe control.

TR25~TR27 forms Schmit trigger, which is a level sensitive switch.

The output at the collector of TR26 is now a square wave with transitions occurring at a predetermined input level.

Each time the input level is higher than base level of TR26, the output goes High.

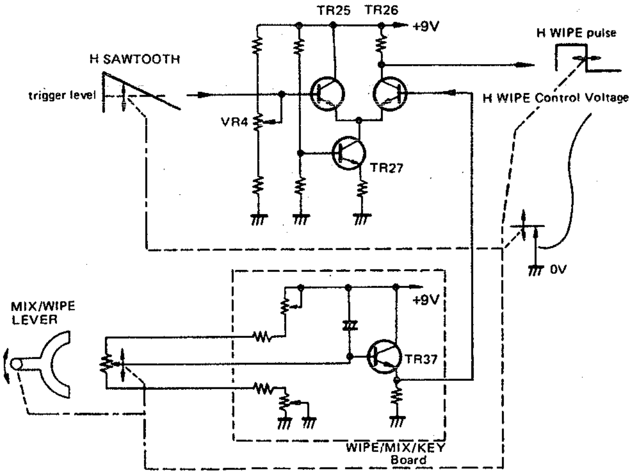

TR25
TR26
+9V
H WIPE pulse
H SAWTOOTH
trigger level
VR4
H WIPE Control Voltage
TR27
0V
MIX/WIPE LEVER
+9V
TR37
WIPE/MIX/KEY Board

Fig. 18 H. Waveform Processor Circuit

4-6 V-WAVEFORM PROCESSOR (TR11 ~ TR13)

It is similar to H-WAVEFORM PROCESSOR.

4-7 H AND V WIPE PULSE MIX (D3, D4)

The output of H and V switching pulse is taken from the emitter of TR28 and TR14 respectively, and enters D3 and D4 which is a NAM (Non Additive Mix) circuit which passes to the output only the signal which is greated of the two input signals.

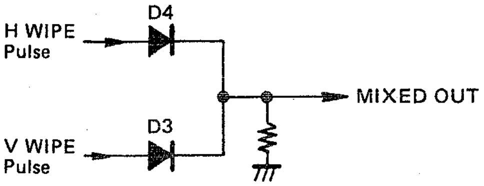

D4
H WIPE Pulse
MIXED OUT
D3
V WIPE Pulse

Fig. 19 H/V Wipe Pulse Mix Circuit

4-8 WIPE OUT SWITCH (TR29 ~ TR31)

TR31 is controlled by the WIPE control signal supplied from WAVEFORM PROCESSOR BOARD. When the WIPE ON/OFF SW is depressed, WIPE control signal is high allowing the WIPE OUT signal to pass to WIPE/MIX/ KEY BOARD.

When the MIX/WIPE lever is located in the top position, A limit SW is closed, causing the base potential of TR30 to become low, thereby turning TR30 ON and WIPE OUT is inhibited.

Also when the MIX/WIPE lever is located at extreme bottom, B limit SW is closed, causing the base potential of TR29 to become low, thereby turning TR29 OFF and WIPE OUT is inhibited.

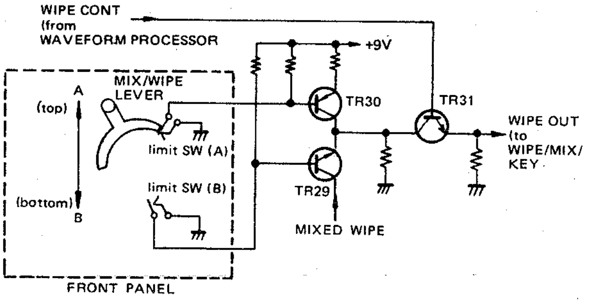

WIPE CONT
(from
WAVEFORM PROCESSOR
+9V
MIX/WIPE
LEVER
A
(top)
limit SW (A)
limit SW (B)
(bottom)
B
TR30
TR31
TR29
WIPE OUT
(to
WIPE/MIX/
KEY
MIXED WIPE
FRONT PANEL

Fig. 20 H. Out Switch Circuit

5 WAVEFORM PROCESSOR BOARD

This circuit board generates, positive HD, positive VD, positive SYNC, clamp pulse and vertical interval switching pulses. It feeds them to the boards requiring these signals.

5-1 HD REGEN (TR1)

The HD pulse is inverted to positive HD, by TRI.

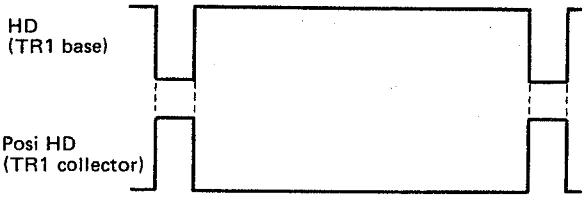

HD
(TR1 base)
Posi HD
(TR1 collector)

Fig. 21 HD Pulse

5-2 VD REGEN (TR2)

The VD pulse is inverted to positive VD by TR2.

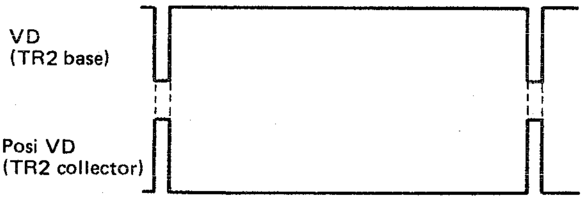

VD
(TR2 base)
Posi VD
(TR2 collector)

Fig. 22 VD Pulse

5-3 SYNC REGEN (TR6, TR7)

THE SYNC pulse is inverted to positive SYNC by TR6. TR7 is a buffur circuit.

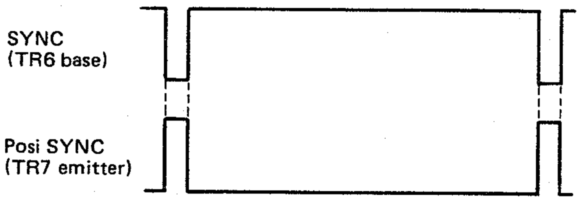

SYNC
(TR6 base)
Posi SYNC
(TR7 emitter)

Fig. 23 Sync Pulse

5-4 CLAMP PULSE GEN (TR8 ~ TR10)

The SYNC pulse is amplified by TR8 and the inverted output is differentiated by C11 and R29.

Then the differentiated pulse is re-amplified by TR9 to generate a clamp pulse.

TR10 is a buffer circuit.

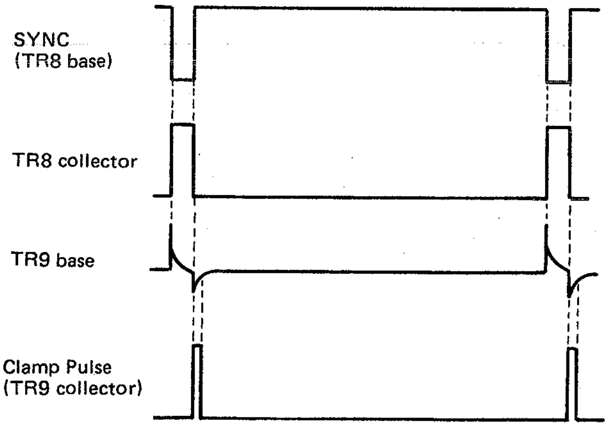

SYNC
(TR8 base)
TR8 collector
TR9 base
Clamp Pulse
(TR9 collector)

Fig. 24 Clamp Pulse

5-5 VERTICAL INTERVAL SWITCHING PULDE GEN (TR3)

The VD pulse inverted by TR2 is differentiated by C5 and R7.

Then the differentiated pulse is amplified by TR3 to generate a vertical interval switching pulse.

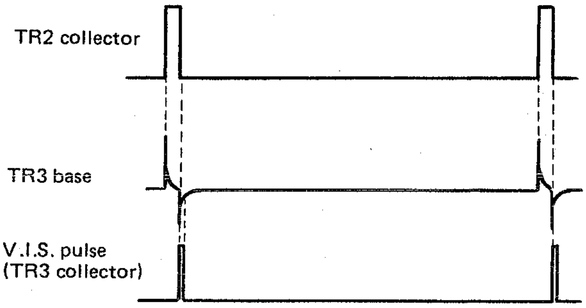

TR2 collector
TR3 base
V.I.S. pulse
(TR3 collector)

Fig. 25 V. Interval Switching Pulse

5-6 FUNCTION SELECTOR CIRCUIT (IC1, TR4, and TR5)

This circuit develops a signal to control the WIPE/MIX Switch (TR15 and TR16, on WIPE/MIX/KEY BOARD, INT/EXT KEY Switch (TR27, on WIPE/MIX/KEY BOARD), and WIPE SWITCH (TR31, on WAVEFORM GENERATOR BOARD).

SWITCH (TR31, on WAVEFORM GENERATOR BOARD).

Transitions of a D type flip-flop IC1 can only take place during vertical interval to prevent noise at the output picture while switching between functions.

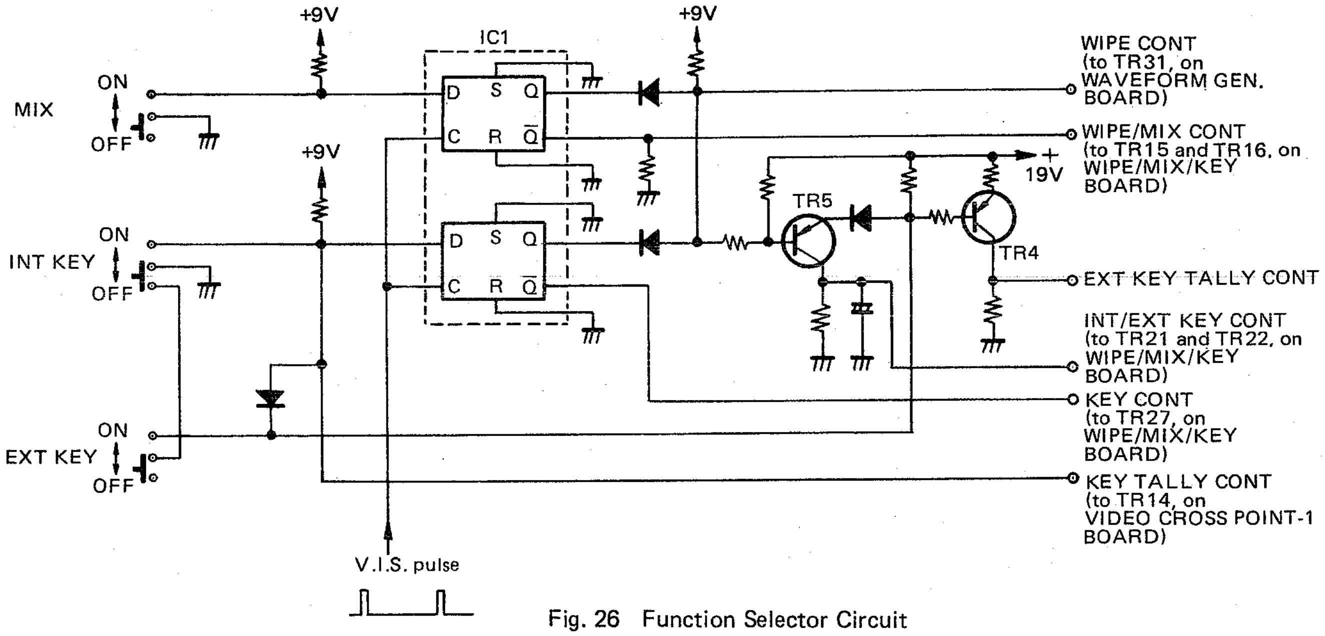

+9V
+9V
+9V
IC1
MIX
ON
OFF
INT KEY
ON
OFF
EXT KEY
ON
OFF
D S Q
C R Q̄
D S Q
C R Q̄
TR5
TR4
+ 19V
WIPE CONT (to TR31, on WAVEFORM GEN. BOARD)
WIPE/MIX CONT (to TR15 and TR16, on WIPE/MIX/KEY BOARD)
EXT KEY TALLY CONT
INT/EXT KEY CONT (to TR21 and TR22, on WIPE/MIX/KEY BOARD)
KEY CONT (to TR27, on WIPE/MIX/KEY BOARD)
KEY TALLY CONT (to TR14, on VIDEO CROSS POINT-1 BOARD)
V.I.S. pulse

Fig. 26 Function Selector Circuit

6 PREVIEW/EFFECT OUTPUT BOARD

This circuit board takes PREVIEW and EFF signals, and feeds these to respective output circuits, and adds sync to non-composite signal. When the CUT switch is ON, PREVIEW and EFF buses are reversed.

6-1 PHASE SHIFTER (TR1 ~ TR4)

TR1 to TR3 makes up a phase shifter circuit which makes preview subcarrier phase identical to the subcarrier phase of EFF signal which has the greatest phase lag.

VR1 adiusts the PREVIEW/PROGRAM phase.

6-2 CUT CONTROL (TR5 ~ TR8)

This circuit reverses the preview and program buses when the CUT switch is ON.

When the CUT and EFF buttons are OFF, the CUT CONTROL signal is low, which permits the preview signal to pass to the preview output.

When the CUT button is depressed, the CUT CONTROL signal becomes high, which now allows the EFF signal to pass to the preview output.

When the EFF button is ON, both CUT CONT & EFF CONT signals are both high, a condition which permits the EFF signal to pass to PREVIEW and PROGRAM OUTPUTS.

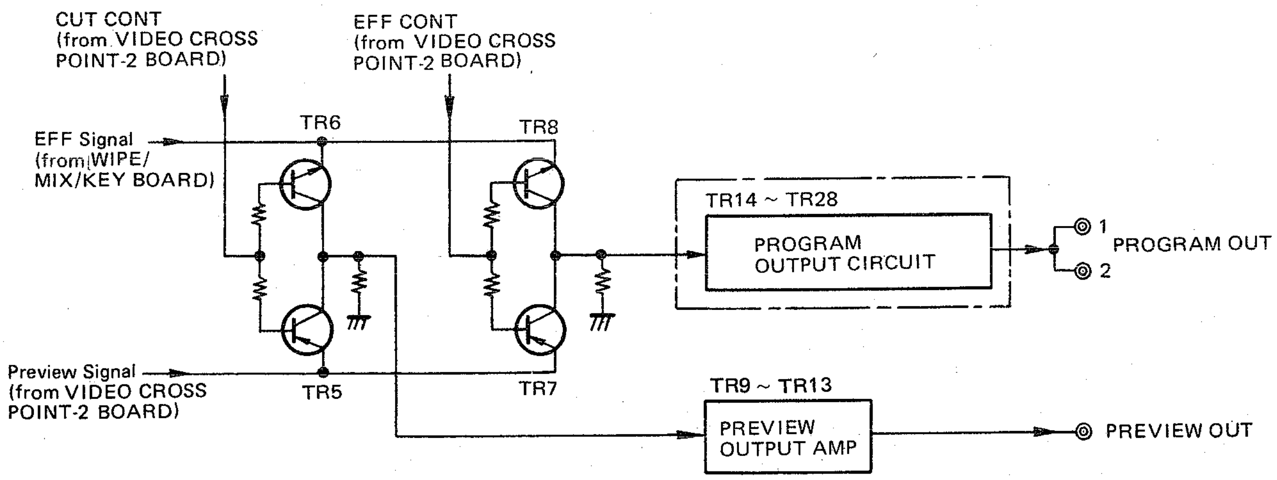

CUT CONT (from VIDEO CROSS POINT-2 BOARD)
EFF CONT (from VIDEO CROSS POINT-2 BOARD)
EFF Signal (from WIPE/MIX/KEY BOARD)
Preview Signal (from VIDEO CROSS POINT-2 BOARD)
TR6
TR8
TR5
TR7
TR14 ~ TR28
PROGRAM OUTPUT CIRCUIT
1
2
PROGRAM OUT
TR9 ~ TR13
PREVIEW OUTPUT AMP
PREVIEW OUT

Fig. 27 Cut Control Circuit

SW / SIGNAL	CUT OFF		CUT ON	
	EFF OFF	EFF ON	EFF OFF	EFF ON
CUT CONT	L	H	H	H
EFF CONT	H	H	L	H

6-3 PREVIEW OUTPUT AMP (TR9 ~ TR13)

Preview signal is clamped by TR9, and fed to emitter of TR12 through buffer TR10/TR11 and VR6 which serves as gain adjustment. TR12 is a grounded base amplifier which amplifies the Preview video signal and feeds it to the emitter follower TR13, to convert the output impedance to 75Ω.

6-4 SYNC DETECTOR FOR PREVIEW (TR15 ~ TR18, TR28, IC1, IC2a)

Preview signal is clamped by TR9, and fed to the base of TR15. TR15 and TR16 slice the Preview signal to provide a sync signal. VR5 adjusts the slice level. Sync is amplified by TR28 to trigger the retriggerable monostable multivibrator IC2a. Since it's time constant is set at 100µsec (T = 100K: R46 x 0.001µ: C18), $\overline{Q}$ is always Low when a composite signal is at the input. Therefore, TR18 is kept off in order not to allow sync add (it is not needed).

When the Preview signal is non-composite, $\overline{Q}$ of IC2a becomes High, TR18 is turned on and a positive sync is fed to the base of TR12, which combines sync with the non-composite Preview signal to create a composite signal.

6-5 EFF OUTPUT AMP (TR19 ~ TR21)

6-6 SYNC DETECTOR FOR EFF (TR22 ~ TR26, IC1, IC26)

It is similar to PREVIEW OUTPUT AMP and SYNC DETECTOR FOR PREVIEW.

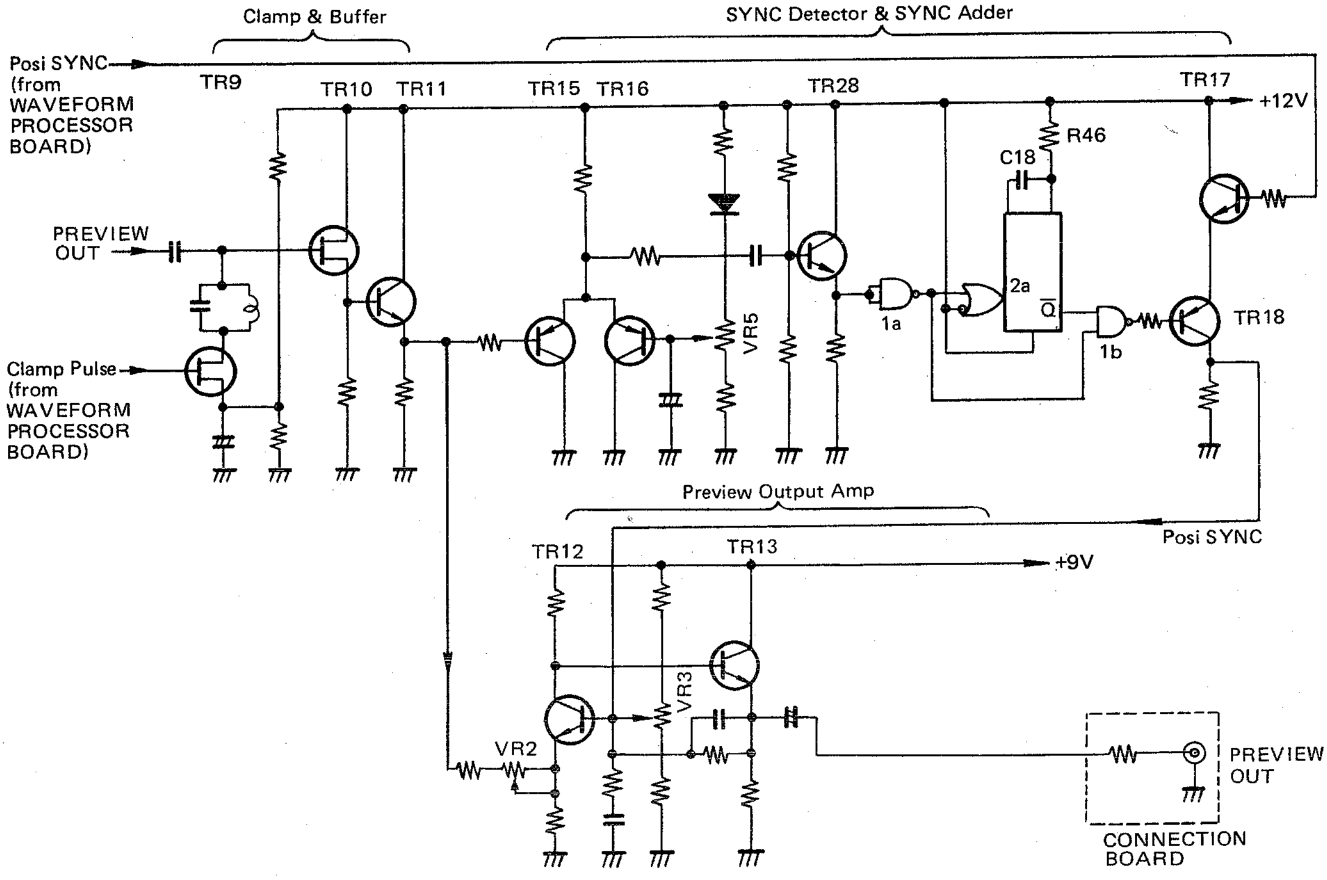

Clamp & Buffer
SYNC Detector & SYNC Adder
Posi SYNC
(from WAVEFORM PROCESSOR BOARD)
TR9
TR10
TR11
TR15
TR16
TR28
TR17
+12V
R46
C18
PREVIEW OUT
2a
Q̄
1a
1b
TR18
VR5
Clamp Pulse
(from WAVEFORM PROCESSOR BOARD)
Preview Output Amp
Posi SYNC
TR12
TR13
+9V
VR3
VR2
PREVIEW OUT
CONNECTION BOARD

Fig. 28 Preview Out Amplifier and Sync Detector Circuit

7 PROGRAM OUTPUT BOARD (YWJ4600ZK07)

This circuit board takes the EFF video signal or Preview signal, adds a new burst signal, and if desired, superimposes by keying in the Super video signal to feed the program output terminal.

7-1 CLAMP AND BUFFER (TR14 ~ TR16)

The EFF video signal is clamped by TR14 and fed to pin No. 1 of IC1.

VR4 adjusts the setup level of the program video.

7-2 BURST KILLER/BURST ADDER (IC1,TR17 TR18)

The purpose of this circuit is to add new blanking and burst signal to the EFF or Preview video. The circuit works in the following way.

The EFF or Preview video signal enters pin No. 1 of IC1. The burst signal generated by BURST GEN (TR1~TR6) enters pin No. 13 of IC1.

A negative going blanking pulse is applied to the IC control inputs at pin No. 4 and pin No. 12 of IC1.

While the blanking pulse is negative, Q2 and Q6 within IC1 are shut off, which allows only the burst signal to pass to the output. For the rest of the time only video signal passes to the output.

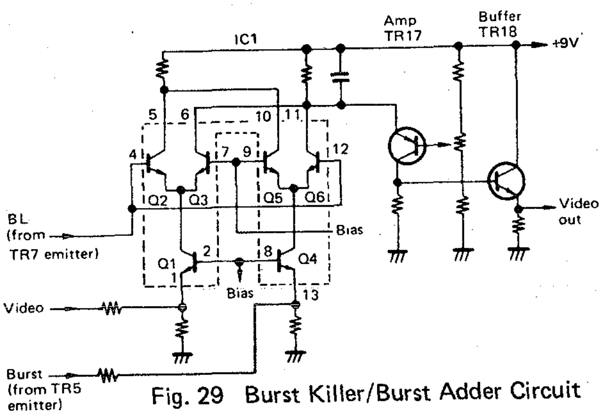

IC1
Amp TR17
Buffer TR18
+9V
5
6
10
11
12
4
7
9
Q2
Q3
Q5
Q6
2
8
Q1
Q4
Bias
Bias
13
BL (from TR7 emitter)
Video
Burst (from TR5 emitter)
Video out

Fig. 29 Burst Killer/Burst Adder Circuit

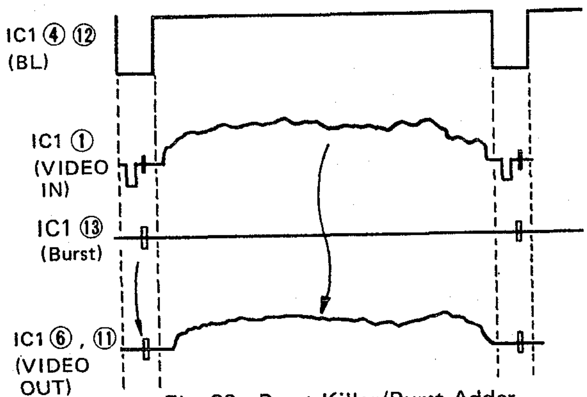
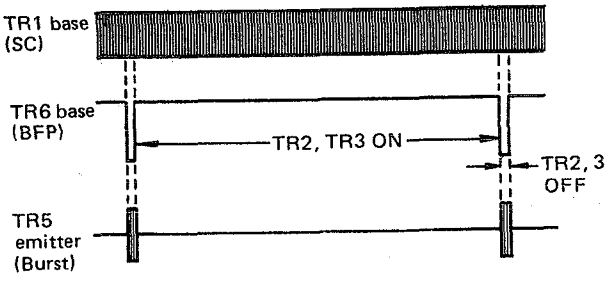


Fig. 30 Burst Killer/Burst Adder

7-3 BURST GEN (TR1 ~ TR6)

The incomming subcarrier enters TR1 buffer. The burst flag pulse is applied to the switching circuit composed of TR2 and TR3. When the burst flag pulse is negative, TR2 and TR3 are turned OFF, which allows the subcarrier to pass to TR4 buffer. At other times the subcarrier is greatly attenuated by turned ON TR2/TR3. The burst signal thus produced passes through a band pass filter composed of L1 and C4.

VR1 adjusts the burst gain of the Program Out signal.



7-4 SLICE CIRCUIT (TR10 ~ TR13)

TR10~TR13 slices the Super video signal to provide a Super Key signal. The Super video signal is clamped by TR10, clamping the back porch of the signal, and buffered by TR11. The Super signal is then fed to TR12 for non-linear amplification. Any portion of the signal which lies below the emitter voltage (slice point) is blocked. The result is amplified by TR12 and TR13.

The slice point can be varied by VR3, SUPER LEVEL Control.

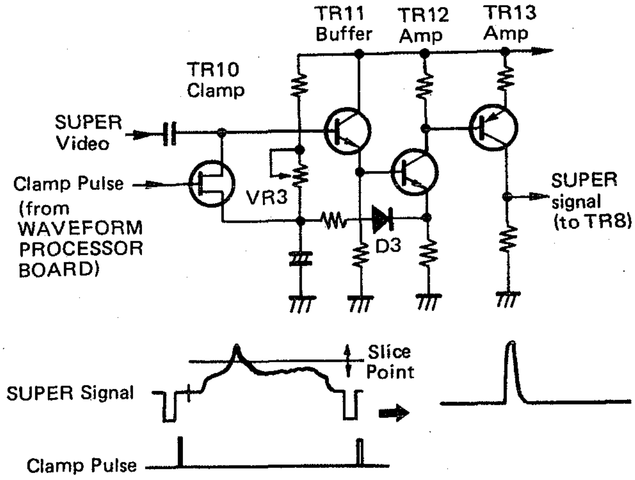

TR11 Buffer
TR12 Amp
TR13 Amp
TR10 Clamp
SUPER Video
Clamp Pulse (from WAVEFORM PROCESSOR BOARD)
VR3
D3
SUPER signal (to TR8)
Slice Point
SUPER Signal
Clamp Pulse

Fig. 32 Slice Circuit

7-5 NAM CIRCUIT (TR18, TR20)

TR18 and TR20 constitute a non-additive mixing (NAM) circuit. A NAM circuit takes several input signals and allows only the one with highest potential to pass.

When the SUPER switch is depressed, TR8 allows the Super Key signal to pass to TR20.

While Program video signal is applied to the base of TR18, the super input signal will be superimposed onto the line signal.

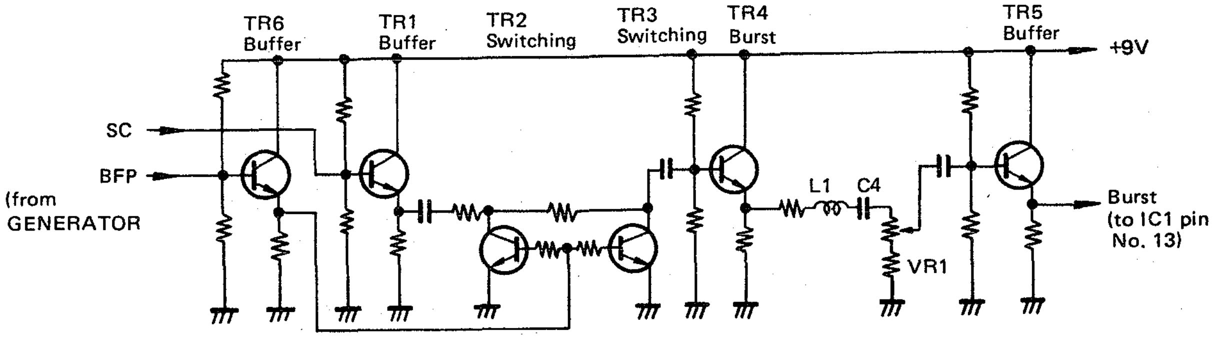

TR6 Buffer
TR1 Buffer
TR2 Switching
TR3 Switching
TR4 Burst
TR5 Buffer
+9V
SC
BFP
(from GENERATOR
L1
C4
VR1
Burst (to IC1 pin No. 13)

Fig. 31 Burst Generator Circuit

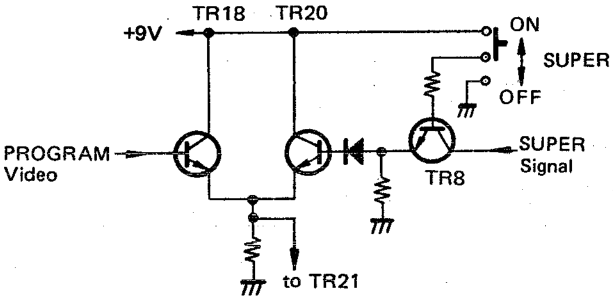

TR18
TR20
+9V
ON
SUPER
OFF
PROGRAM
Video
SUPER
Signal
TR8
to TR21

Fig. 33 NAM Circuit

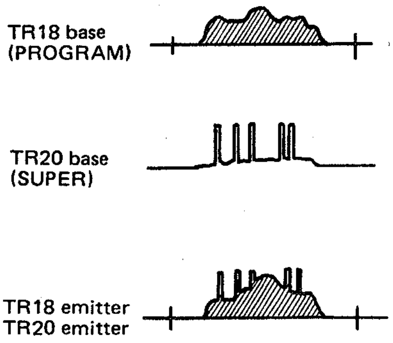

TR18 base
(PROGRAM)
TR20 base
(SUPER)
TR18 emitter
TR20 emitter

Fig. 34 NAM Output

7-6 WHITE CLIP (TR21, TR22)

TR21 and TR22 forms a white clip circuit, which works in the following manner.

Any signal applied to the base of TR21 would normally appear at the emitter with approximately the same magnitude and potential. A potential from the wiper of VR6 is applied to the base of TR22.

If the signal to the base of TR21 rises above the potential setting of VR6, TR21 will be cut off, and the emitter voltage (due to the conduction of TR22) will not rise above the VR6 wiper setting.

So VR6 serves as a WHITE CLIP LEVEL adjust.

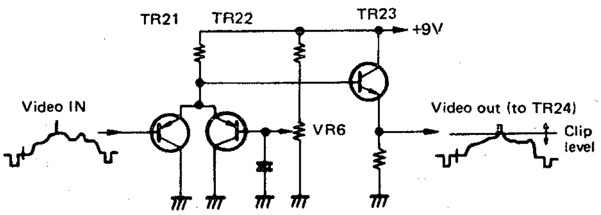

TR21
TR22
TR23
+9V
Video IN
VR6
Video out (to TR24)
Clip
level

Fig. 35 White Clip Circuit

7-7 VIDEO DISTRIBUTION AMP FOR PROGRAM OUT (TR24 ~ TR25, TR27 ~ TR28)

The Program video signal from TR23 is applied to the emitter of TR24 through VR7 PROGRAM OUT LEVEL adjust.

The positive sync is applied to the base of TR24 through VR2 SYNC LEVEL adjust.

The composite signal at the collector of TR24 is applied to the base of TR25.

TR25 is an output emitter follower with negative feedback introduced into the base of TR24. C27 serves as a high frequency adjust. TR27, and TR28 form a complementary amplifier circuit with negative feedback sent to the base of TR24, which drives two line outputs.

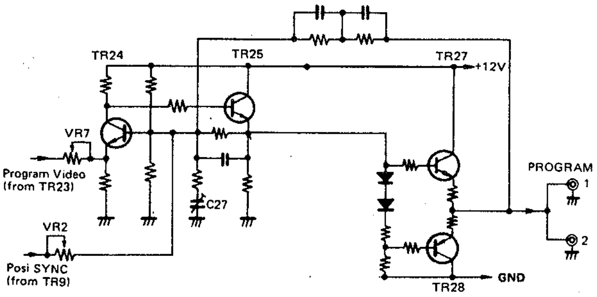

TR24
TR25
TR27
+12V
VR7
Program Video
(from TR23)
C27
VR2
Posi SYNC
(from TR9)
PROGRAM
1
2
TR28
GND

Fig. 36 Program Out Distribution Amp Circuit

8. SYNC GENERATOR BOARD

8-1 Gen-Lock Sync Separation

Outline

When the gen-lock signal (black burst or V.B.S signal) is supplied to the GEN-LOCK connector on the rear panel, this circuit separates sync signal and detects burst signal from gen-lock signal.

Details

When the gen-lock signal is supplied to the GEN-LOCK connector on the rear panel, it is fed to the base of Q1 through terminal No. 15A of CN23. The gen-lock signal is then supplied to sync separator Q2 through buffer Q1 and burst gate Q3, Q4 and Q5. The sync signal on gen-lock signal is separated by Q2 and fed to 2fH eliminator circuit and field detector circuit.

The gen-lock signal (A) obtained at the emitter of Q1 is supplied to the base of burst gate Q3. The burst gate pulse (B) obtained at pin 12 of IC2 is supplied to the base of burst gate Q4. Q3 is turned ON by the negative portion of burst gate pulse and the burst signal on the gen-lock is gated. The burst signal (D) thus gated is supplied to burst flag pulse generator circuit through inverter Q5 and buffer Q6, and gen-lock subcarrier lock circuit on the Subcarrier Board through terminal 12B of CN23.

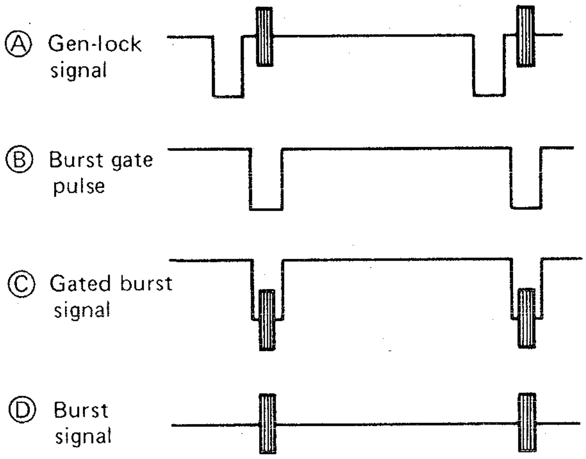

Ⓐ Gen-lock signal
Ⓑ Burst gate pulse
Ⓒ Gated burst signal
Ⓓ Burst signal

Fig. 37 Burst Gate

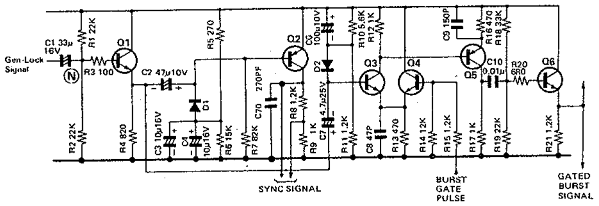

Gen-Lock Signal
C1 33μ 16V
Ⓝ
R1 22K
R3 100
Q1
R2 22K
R4 820
C2 47μ10V
D1
C3 10μ16V
C4 10μ16V
R5 270
R6 15K
R7 82K
C70 270PF
Q2
C6 100μ10V
D2
R8 1.2K
R9 1K
C7 4.7μ25V
R10 5.6K
R11 1.2K
R12 1K
Q3
C8 47P
R13 470
Q4
R14 12K
R15 1.2K
C9 150P
R16 470
Q5
R17 1K
R18 33K
C10 0.01μ
R19 22K
R20 6R0
Q6
R21 1.2K
SYNC SIGNAL
BURST GATE PULSE
GATED BURST SIGNAL

Fig. 38 Gen-Lock Sync Separation Circuit

8-2 2fH Elimination

Outline

This circuit removes equalizing and serration pulses on the H.sync pulse.

Details

Separated gen-lock sync signal (A) obtained at collector of Q2 is supplied to base of inverter Q11 through 4.43MHz trap circuit consisting of L2, C21 and C22. The sync pulse (B) is supplied to pin 9 of monostable multivibrator IC5 from Q11, where the equalizing and serration pulses on the sync pulse are removed, and H.pulse (D) and (E) are generated.

The H.pulse obtained at pin 4 of IC5 is fed to the base of inverter Q5 in gen-lock subcarrier lock circuit and gen-lock signal detection circuit on the Subcarrier Board through terminal 13B of CN23.

The H.pulse at pin 13 of IC5 is then fed to pin 9 of monostable multivibrator IC2 to generate burst gate pulse.

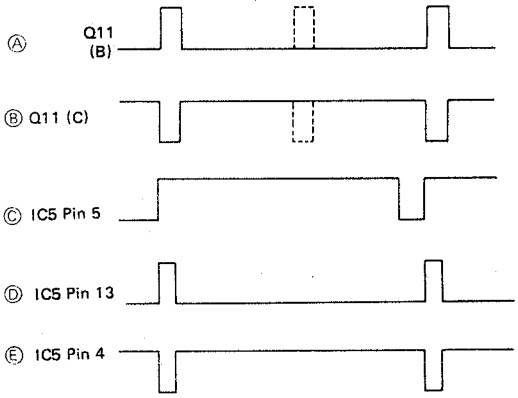

Ⓐ Q11 (B)
Ⓑ Q11 (C)
Ⓒ IC5 Pin 5
Ⓓ IC5 Pin 13
Ⓔ IC5 Pin 4

Fig. 39 2fH Elimination

8-3 Burst Gate Pulse Generator

Outline

This circuit receives H.pulse from 2fH elimination circuit and generates burst gate pulse.

Details

H.pulse (B) obtained at pin 13 of IC5 is supplied to pin 9 of monostable multivibrator IC2 to generate burst gate pulse.

The negative polarity burst gate pulse is supplied to the base of Q4. The positive polarity burst gate pulse is supplied to pin 9 of burst flag pulse generator IC1 and pin 1 of IC8 in phase-lock-loop circuit.

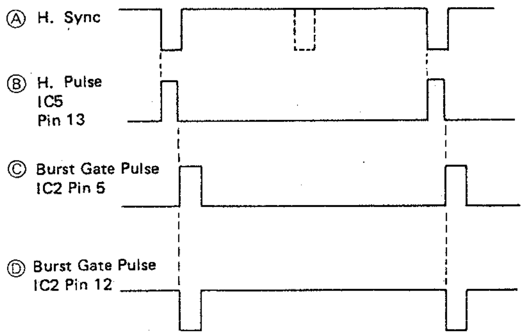


Fig. 40 Burst Gate Pulse

8-4 Sync Generator Circuit

Outline

This circuit generates all sync pulses which are used in the SEG and sends out to other system from SEG.

Details

The pulse generator circuit consists of 8.86MHz (2fsc : Twice of PAL subcarrier frequency) crystal oscillator X2, sync generator IC6, 2.53MHz (fvco : frequency voltage controlled oscillator : 162fH) crystal oscillator X1, internal/external switch control Q14 and Q41, buffer Q13 and signal outputs Q18 to Q35.

The 8.86MHz frequency oscillated by the 8.86MHz crystal oscillator consisting of X2 and VC2 (4.43MHz ADJ) is connected to pin 5 and pin 6 of IC6. The 2.53MHz frequency oscillated by the 2.53MHz crystal oscillator consisting of X1 and VC1 (PHASE LOCK) is connected to pin 14 and pin 15 of IC6 to generate pulses.

When the gen-lock signal is supplied to the GEN-LOCK connector and turn ON the GEN-LOCK switch on the front panel, low level signal is supplied to the base of internal/external switch control Q14 and Q41 from Subcarrier board through terminal 21B of CN23, then the 8.86MHz crystal oscillator and 2.53MHz crystal oscillator stop oscillation. The vertical reset pulse obtained at pin 4 of IC3 is supplied to pin 11 of IC6 through inverter Q12 and 2.53MHz signal obtained at source of Q39 is supplied to pin 16 of IC6 through inverter Q15 to generate pulses.

The following pulses are generated from IC6.

Pin 4 : Subcarrier (Internal mode only)
Pin 10 : Vertical Drive (VD) Pulse
Pin 19 : Composite Sync Pulse
Pin 20 : Burst Flag Pulse (BFP)
Pin 21 : Horizontal Drive (HD) Pulse
Pin 22 : Composite Blanking Pulse
Pin 23 : PAL Pulse

The relative correlations for each pulse is shown in Fig. 41.

The subcarrier signal at pin 4 of IC6 is supplied to pin 3 of sc selector circuit IC2 on the Subcarrier Board through buffer Q13 and terminal No. 20B of CN23.

The vertical drive pulse at pin 10 of IC6 is supplied to terminal No. 17B of CN23 through buffer Q30, Q31 and inverter Q32.

The composite sync signal at pin 19 of IC6 is supplied to terminal No. 19B of CN23 through buffer Q27, Q28 and inverter Q29.

The burst flag pulse at pin 20 of IC6 is supplied to terminal 11B of CN23 through buffer Q24, Q25 and inverter Q26.

The horizontal drive pulse at pin 21 of IC6 is supplied to terminal No. 8B of CN23 through buffer Q33, Q34 and inverter Q35, H. phase circuit Q16.

The composite blanking pulse at pin 22 of IC6 is supplied to terminal No. 6B of CN23 through buffer Q21, Q22 and inverter Q23.

The PAL pulse at pin 23 of IC6 is supplied to terminal No. 14A of CN23 through buffer Q18, Q19 and inverter Q20, and terminal No. 14B of CN23.

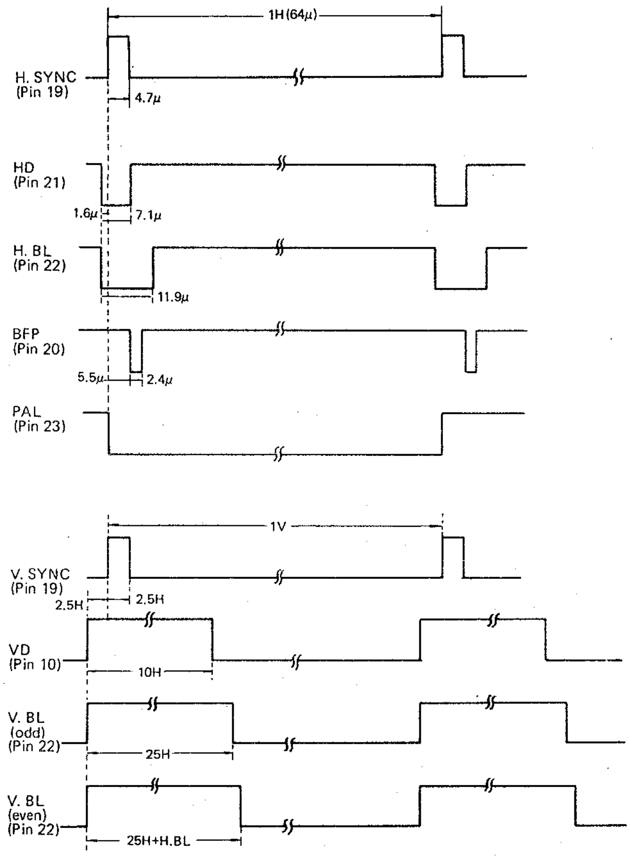


Fig. 41 Pulses

8-5 H.Phase Circuit

Outline

This circuit receives horizontal drive pulse from sync generator IC6 and generates horizontal delay pulse as a reference for phase detector in phase- lock-loop circuit.

Details

The horizonal drive pulse (A) is supplied to pin 9 of monostable multivibrator IC7 through inverter Q16 from pin 21 of sync generator IC6.

The pulse phase is controlled by VR3 (G/L H.PHASE).

The horizontal delay pulse (D) is obtained at pin 13 of IC7 and then supplied to pin 3 of phase detector IC8.

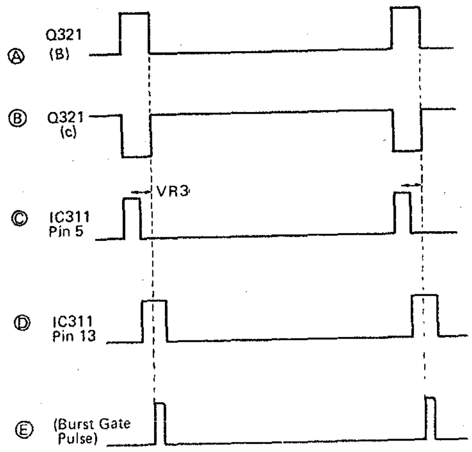


Fig. 42 H. Phase

8-6 Phase-Lock-Loop Circuit

Outline

While the gen-lock signal is supplied to the GEN-LOCK connector, this circuit generates 2.53MHz signal from the burst gate pulse and horizontal delay pulse and generated 2.53MHz signal is sent to the sync generator IC6 for producing the sync pulses.

Details

When the gen-lock signal is supplied to the GEN-LOCK connector, the burst gate pulse from pin 5 of IC2 and horizontal delay pulse from pin 13 of IC7 are supplied to pin 1 and pin 3 of phase detector IC8 respectively. In IC8, burst gate pulse and horizontal delay pulse are compared, and a pulse whose width corresponds to the phase difference between the two is obtained at pins 5 and 10. This pulse is converted into the DC voltage by the active low pass filter consisting of Q36 and Q37. This DC voltage is supplied to the voltage controlled oscillator (V.C.O.) of Q38, Q39 and controls frequency by changing the variable capacitance VC3 (VCO SET).

The signal at source of Q39 is controlled ON and OFF by Internal/External control signal from Subcarrier Board through terminal 18B of CN23 and switching Q40. And this signal is fed to pin 16 of IC6 through inverter Q15. The frequency of the sync signals are therefore controlled in order to generate pulses whose relative phase match with that of the H.sync of the gen-lock signal.

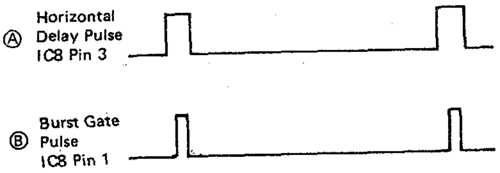

Ⓐ Horizontal Delay Pulse IC8 Pin 3
Ⓑ Burst Gate Pulse IC8 Pin 1

Fig. 43 Horizontal Delay Pulses

8-7 Burst Flag Pulse (B.F.P) Generator Circuit

Outline

This circuit receives gated gen-lock burst signal and burst gate pulse, and then generates burst flag pulse.

Details

When gen-lock signal is supplied to GEN-LOCK connector, burst signal is supplied to the base of inverter Q7 from gen-lock sync separation circuit Q6 and burst gate pulse is supplied to pin 9 of NAND gate IC1 from burst gate pulse generator IC2. The burst signal is gated by burst gate pulse and then burst flag pulse is supplied to pin 13 of IC1 in field detector through inverter Q8. Noise of differential pulse obtained at the base of Q7 is removed by inverter Q7 and NAND gate IC1.

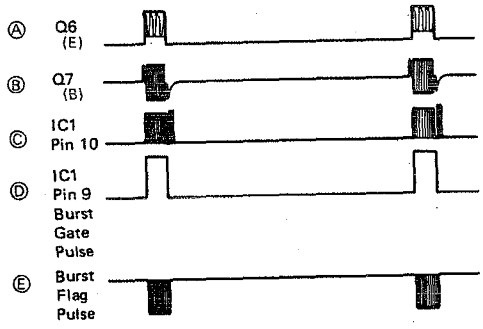


Fig. 44 Burst Flag Pulse

8-8 Field Detector

Outline

This circuit receives sync signal from sync separator circuit and burst flag pulse from burst flag pulse generator circuit and then generates trigger pulse which is obtained in third field.

Details

When the gen-lock signal is supplied to GEN-LOCK connector, sync signal (A) is supplied to the base of Q9 from sync separator Q2 and H.sync is removed by low pass filter consisting of R29 and C13.

The V.sync (B) obtained at collector of Q9 is fed to pin 1 of monostable multivibrator IC2 and pin 1 of flip-flop IC1. Q10 compensates temperature drift of Q9.

The monostable multivibrator IC2 generates pulse (C) obtained at pin 13 which is used to pick up first burst flag pulse in the third field.

The pulse (C) width is determined by VR1 (BURST DETECT).

The pulse (C) is supplied to pin 12 of IC1 and burst flag pulse is supplied to pin 13 of IC1, where the pulse (H) is generated as a trigger pulse for flip-flop of IC1. This trigger pulse obtained at pin 11 of IC1 (H) is only obtained in every third field. The V.sync pulse (B) is supplied to pin 1 of IC1 and trigger pulse (H) is supplied to pin 5 of IC1, where the pulse (J) is generated for generate vertical reset pulse.

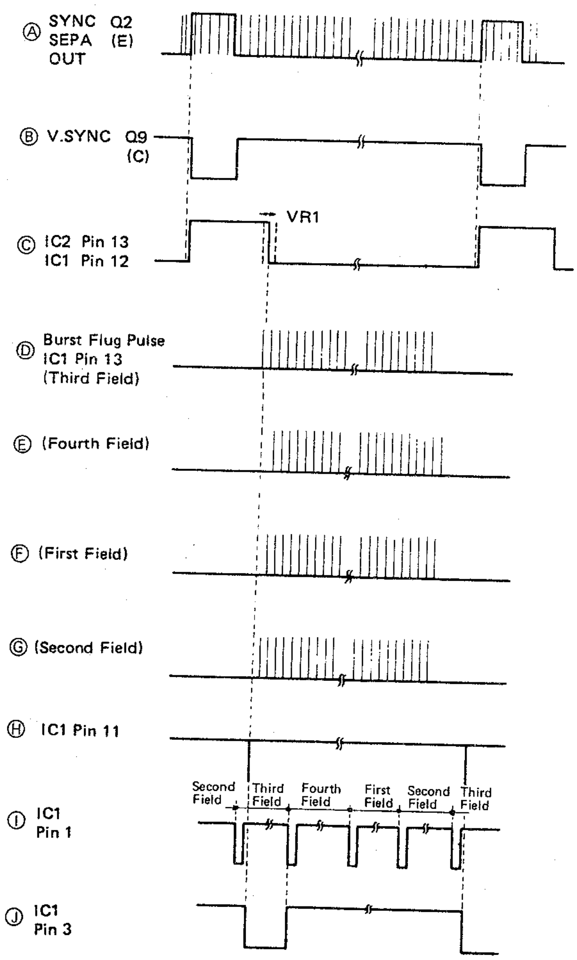

Ⓐ SYNC SEPA OUT Q2 (E)
Ⓑ V.SYNC Q9 (C)
Ⓒ IC2 Pin 13 IC1 Pin 12
VR1
Ⓓ Burst Flug Pulse IC1 Pin 13 (Third Field)
Ⓔ (Fourth Field)
Ⓕ (First Field)
Ⓖ (Second Field)
Ⓗ IC1 Pin 11
Second Field
Third Field
Fourth Field
First Field
Second Field
Third Field
Ⓘ IC1 Pin 1
Ⓙ IC1 Pin 3

Fig. 45

8-9 Vertical Reset Pulse Circuit

Outline

This circuit generates vertical reset pulse and supplied to sync generator IC6 for trigger the sync generator IC6 to generate pulse phase locked to gen-lock signal.

Details

The pulse (C) obtained at pin 3 of IC1 is supplied to pin 10 of monostable multivibrator IC3, where the pulse (E) is generated.

The pulse (E) obtained at pin 4 of IC3 is fed to pin 11 of sync generator IC6 through inverter Q12 as a vertical reset pulse.

VR2 (V.RESET PHASE) controls vertical reset pulse phase.

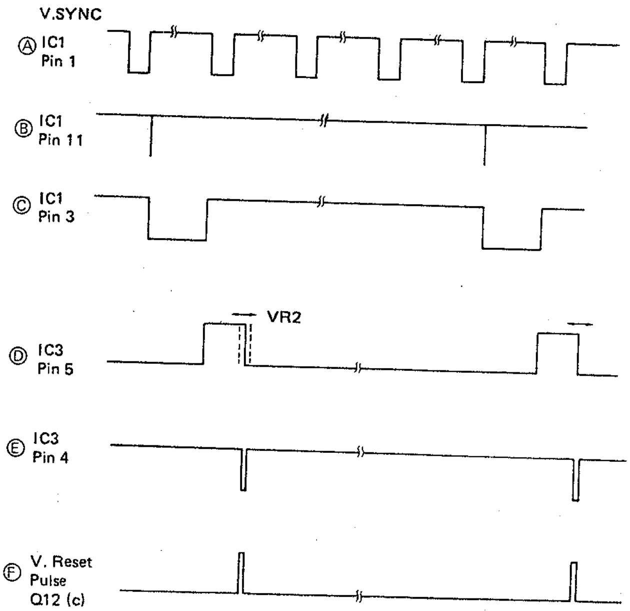

V.SYNC
Ⓐ IC1 Pin 1
Ⓑ IC1 Pin 11
Ⓒ IC1 Pin 3
VR2
Ⓓ IC3 Pin 5
Ⓔ IC3 Pin 4
Ⓕ V. Reset Pulse Q12 (c)

Fig. 46 V. Reset Pulse

9 SUBCARRIER BOARD

9-1 Gen-Lock Signal Detection Circuit

Outline

This circuit detects if a gen-lock signal is supplied to the SEG and set the Gen-Lock ON/OFF switch to ON position or not, and selects the internal or the gen-lock (external) mode. When no gen-lock signal is supplied to the SEG or set the Gen-Lock ON/OFF switch to OFF position, the sync generator circuit is placed in the internal sync operation mode.

When the gen-lock signal is supplied to the SEG and set the Gen-Lock ON/OFF switch to ON position, this circuit detects the gen-lock signal and switches the sync generator circuit to the gen-lock (external) sync operation mode.

Details

When the gen-lock signal is supplied to the GEN-LOCK connector on the rear panel, the H pulse is obtained at pin 4 of IC5 on the Sync Generator board. Then fed to pins 4 and 12 of monostable multivibrator IC3 for control pulse through inverter Q5 and terminal No. 17B of CN23.

The pins 3 and 13 of IC3 receives clock signal from Gen-Lock ON/OFF switch on the Program Output Board.

When the Gen-Lock ON/OFF switch is ON position, pins 3 and 13 of IC3 receives high level and output of IC3 is controlled by control pulse at pins 4 and 12 of IC3. Therefore, when Gen-Lock signal is supplied to SEG and Gen-Lock ON/OFF switch is turned ON as;

Pin 10 of IC3 turns high level (timing by control pulse) and its supplied to base of Q30 on the Program Output Board through inverter Q20 for turns on the Gen-Lock ON/OFF switch lamp.

Pin 9 of IC3 turns low level and its supplied to gen-lock subcarrier lock circuit, subcarrier select circuit to set the gen-lock (external) sync mode. Also low level at pin 9 of IC3 is fed to Video Cross Point-1 and Video Cross Point-2 Boards for input No. 4 tally control.

Pin 6 of IC3 turns high level, pin 7 of IC3 turns low level and these are supplied to switches Q40, Q14, Q41 and pin 13 of IC6 on the Sync Generator Board to set the sync generator to the gen-lock (external) sync mode. Also output level at pins 6 and 7 of IC3 is fed to switches Q20 and Q21 for selected input 4 video signal or Gen-Lock input video signal.

When Gen-Lock signal is not supplied to SEG or Gen-Lock ON/OFF switch is turned OFF, outputs of IC3 and controls are opposite condition.

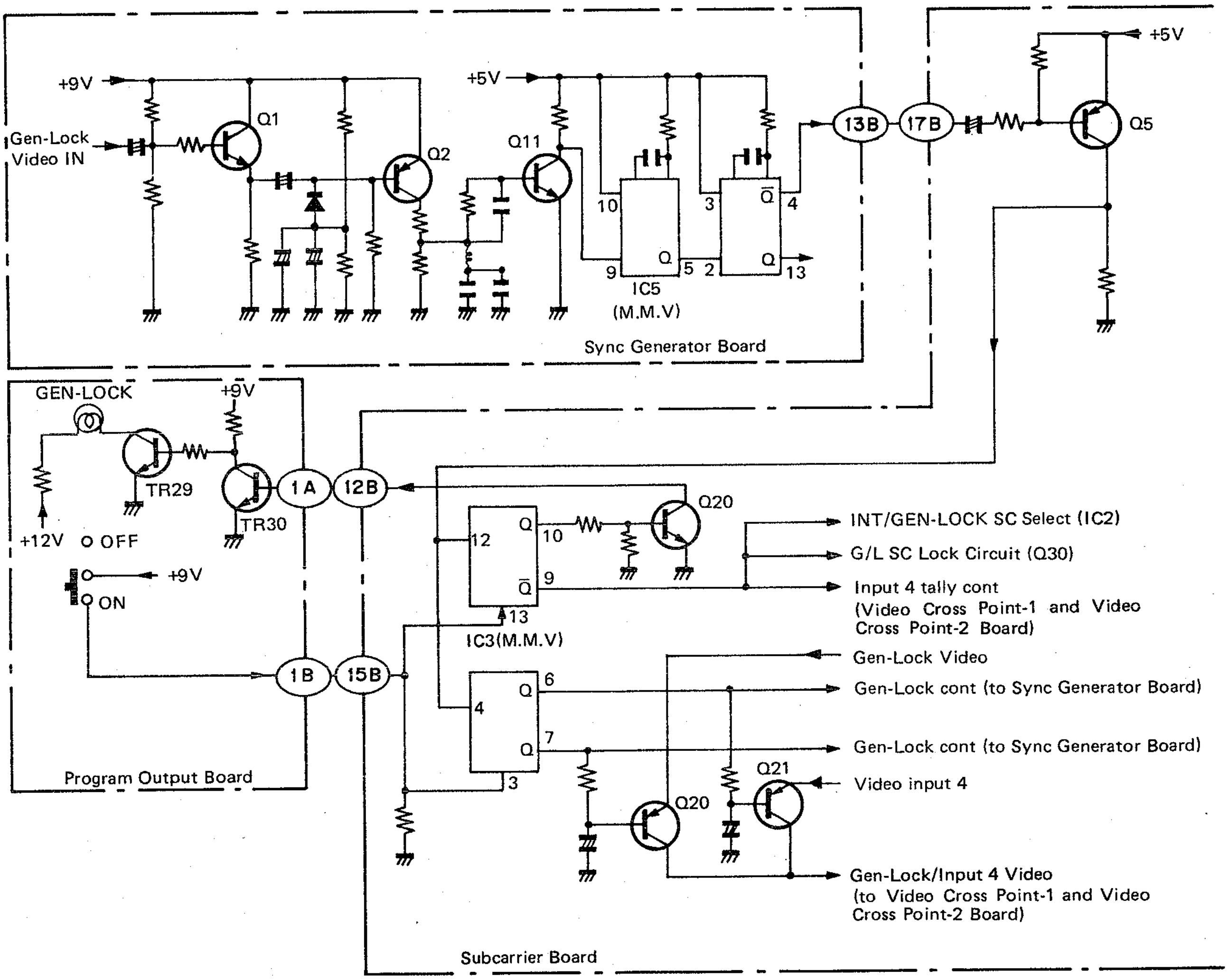

+9V
Gen-Lock Video IN
Q1
Q2
+5V
Q11
10
3
Q̄
4
9
Q
5
2
Q
13
IC5
(M.M.V)
Sync Generator Board
13B
17B
+5V
Q5
GEN-LOCK
+9V
TR29
TR30
+12V
O OFF
+9V
ON
1A
12B
1B
15B
Program Output Board
12
Q
10
Q̄
9
13
IC3(M.M.V)
Q20
INT/GEN-LOCK SC Select (IC2)
G/L SC Lock Circuit (Q30)
Input 4 tally cont
(Video Cross Point-1 and Video Cross Point-2 Board)
Gen-Lock Video
4
Q
6
Gen-Lock cont (to Sync Generator Board)
Q
7
Gen-Lock cont (to Sync Generator Board)
3
Q21
Video input 4
Q20
Gen-Lock/Input 4 Video
(to Video Cross Point-1 and Video Cross Point-2 Board)
Subcarrier Board

Fig. 47 Gen-Lock Signal Detection Circuit

9.2 Gen-Lock Subcarrier Lock Circuit

Outline

When the gen-lock signal is supplied to the GEN-LOCK connector on the rear panel, this circuit generates the subcarrier signal which is synchronized with the burst signal in the gen-lock signal.

Details

When the gen-lock signal is supplied to the GEN-LOCK connector, the gated burst signal (B) is supplied to terminal No. 18B of CN22 from Sync Generator Board. Then it is supplied to pin 6 of gen-lock subcarrier lock IC1 via buffer Q2 and the filter consisting of L1, C4 and C5.

The filter removes the low frequency component (burst gate pulse) from the gated burst signal, and the burst signal (D) is detected.

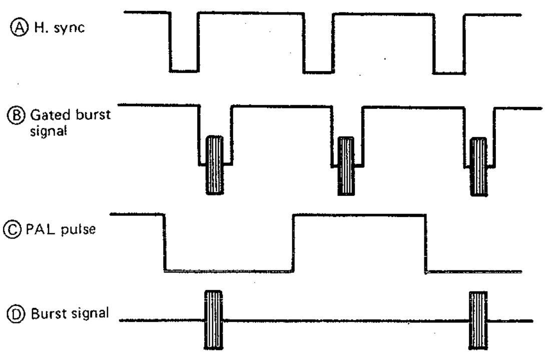

Ⓐ H. sync
Ⓑ Gated burst signal
Ⓒ PAL pulse
Ⓓ Burst signal

Fig. 48 Burst Signal

Gate Q1 is turned on by the PAL pulse at the base and eliminating the gated burst signal once in every 2H period.

The burst signal supplied to pin 6 of IC1 locks 4.43MHz oscillator consisting of crystal oscillator X1, C17, C18, C19 and VR1 (G/L SL LOCK), and the subcarrier (SC) signal locked by the burst signal of gen-lock signal is obtained at pin 14 of IC1. The SC signal is supplied to 360 phase shifter consisting of Q6, Q7, Q8, C23, C25 and VR2 through TTL interface buffer Q4.

The phase of SC signal is controlled by the DC voltage set by VR2 (G/L SC PHASE).

The SC signal synchronized with the burst signal of gen-lock signal at emitter of Q9 is then supplied to the SC selector circuit.

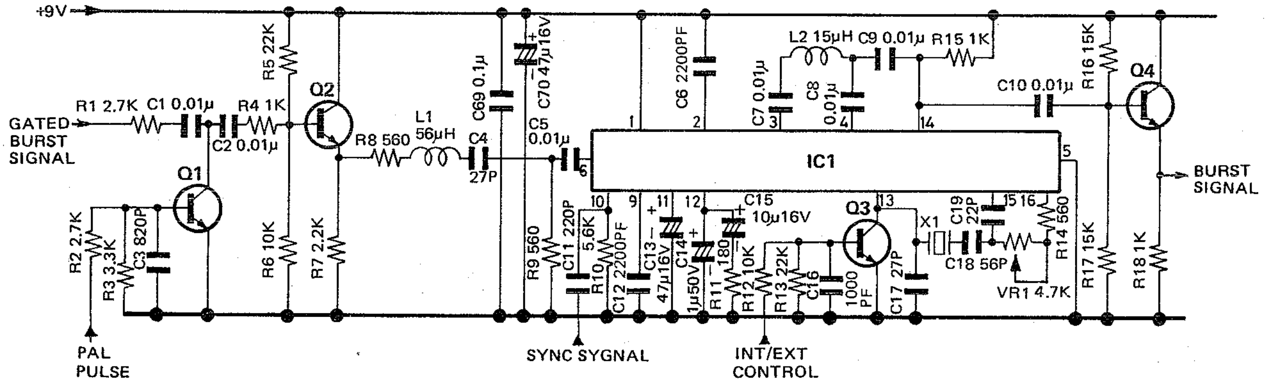

+9V
GATED BURST SIGNAL
R1 2.7K
C1 0.01µ
R4 1K
C2 0.01µ
R5 22K
Q2
Q1
R2 2.7K
R3 3.3K
C3 820P
R6 10K
R7 2.2K
PAL PULSE
L1 56µH
R8 560
C4 27P
C69 0.1µ
C70 47µ16V
C5 0.01µ
R9 560
C11 220P
R10 5.6K
C12 2200PF
C13 47µ16V
C14 µ50V
R11 180
R12 10K
R13 22K
C16 1000 PF
C17 27P
C15 10µ16V
Q3
C6 2200PF
C7 0.01µ
C8 0.01µ
L2 15µH
C9 0.01µ
R15 1K
C10 0.01µ
R16 15K
Q4
IC1
1
2
3
4
14
5
6
10
9
11
12
13
15
16
X1
C19 22P
C18 56P
R14 560
VR1 4.7K
R17 15K
R18 1K
BURST SIGNAL
SYNC SYGNAL
INT/EXT CONTROL

Fig. 49 Gen-Lock SC Lock Circuit

9-3 SC Selector Circuit

Outline

This circuit selects SC signal from gen-lock SC signal or internal SC signal and also selects SC signal for burst signal.

Details

When the gen-lock signal is supplied to the GEN-LOCK connector, gen-lock subcarrier signal is applied to pin 5 of analog switch IC2 and low level signal is applied to pin 9 of IC2 from gen-lock signal detector IC3. When the gen-lock signal is not supplied to the GEN-LOCK connector or GEN-LOCK ON/OFF switch turns OFF, internal subcarrier signal is applied to pin 3 of IC2 and high level signal is applied to pin 9 of IC2 from gen-lock signal detector IC3.

When the high level signal is supplied to pin 9 of analog switch IC2, internal subcarrier signal input of pin 3 is selected.

When the low level signal is supplied to pin 9 of analog switch IC2, gen-lock subcarrier signal input of pin 5 is selected.

Selected SC signal at pin 4 of IC2 is supplied 4.43MHz band pass filter through SC limitter circuit consisting Q10, Q11, Q12 and VR3 (SC LIMITTER).

SC slice level is controlled by the DC voltage set by VR3 (SC LIMITTER).

Band pass filter consisting of L4, L5 and C32 - C36 is removing any harmonic components.

Then the SC signal obtained at emitter of Q15 is supplied to 90° phase shifter circuit consisting of C40 - C42 and L6 (BURST 90° PHASE). Then 90° shifted SC signal is sent to pin 12 of IC2 through buffer Q16. Also the SC signal obtained at emitter of Q15 is supplied to pin 13 of IC2.

SC signal input for pin 13 and 90 shifted SC signal input for pin 12 of analog switch IC2 are selected by PAL pulse at pin 11 of IC2 and selected SC signal for burst signal is supplied to burst generator circuit on the Program Output Board through SC output circuit Q17, Q18 and Q19.

The base of SC amplifier Q24 receives SC signal from Q15, and sends out gain controlled SC signal to Connection Board through buffer Q25 and Q26.

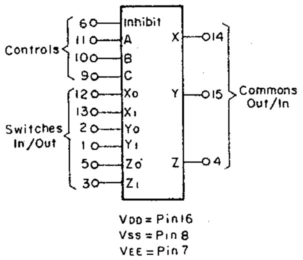

Controls
6
11
10
9
Inhibit
A
B
C
X
14
Switches In/Out
12
13
2
1
5
3
X0
X1
Y0
Y1
Z0
Z1
Y
15
Z
4
Commons Out/In
VDD = Pin16
Vss = Pin 8
VEE = Pin 7

Fig. 50 MC14053 Block Diagram

Control Inputs				ON Switches		
	Select			MC14053B		
Inhibit	C	B	A			
0	0	0	0	Z0	Y0	X0
0	0	0	1	Z0	Y0	X1
0	0	1	0	Z0	Y1	X0
0	0	1	1	Z0	Y1	X1
0	1	0	0	Z1	Y0	X0
0	1	0	1	Z1	Y0	X1
0	1	1	0	Z1	Y1	X0
0	1	1	1	Z1	Y1	X1
1	x	x	x	None		

x = Don't Care

Fig. 51 MC14053 Truth Table

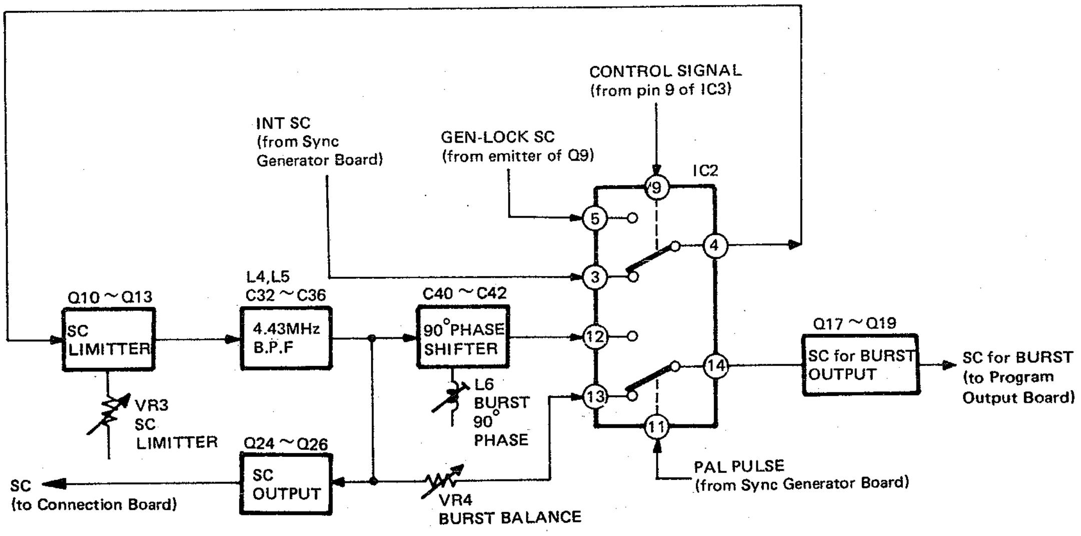

CONTROL SIGNAL (from pin 9 of IC3)
INT SC (from Sync Generator Board)
GEN-LOCK SC (from emitter of Q9)
IC2
9
5
4
3
12
14
13
11
L4,L5 C32 ~ C36
Q10 ~ Q13
SC LIMITTER
4.43MHz B.P.F
C40 ~ C42
90° PHASE SHIFTER
L6 BURST 90° PHASE
Q17 ~ Q19
SC for BURST OUTPUT
SC for BURST (to Program Output Board)
VR3 SC LIMITTER
Q24 ~ Q26
SC OUTPUT
SC (to Connection Board)
VR4 BURST BALANCE
PAL PULSE (from Sync Generator Board)

Fig. 52 SC Selectr Circuit

Service Manual

Special Effects Generator

WJ-4600

Vol. 2

Adjustment Procedures

CONTENTS

1. Test Equipment Required 1

2. Disassembling Procedure 1,2
   - 2-1 For Adjustment 1
   - 2-2 For Lever Unit 2
   - 2-3 For Rear Panel 2

3. Adjustment Procedure 3,4
   - 3-1 Connection and Setting Up for Adjustment 3
   - 3-2 Adjustment . . . . 5~17

4. LOCATION OF TEST POINTS AND ADJUSTING CONTROLS.

SUBCARRIER BOARD 7
SYNC GENERATOR BOARD 7
WAVEFORM PROCESSOR BOARD 8
PROGRAM OUTPUT BOARD 8
WAVEFORM GENERATOR BOARD 16
MOTHER BOARD 16
WIPE/MIX/KEY BOARD 15
PREVIEW/EFFECT OUTPUT BOARD 15

Adjustment Procedure

1. TEST EQUIPMENT REQUIRED

The following equipment is required for adjustment of Special Effects Generator WJ-4600.

- Oscilloscope (dual trace, delayed sweep, 30Hz bandwidth, with three probes)
- Frequency counter
- Underscanned color video monitor (or underscanned B/W video monitor)
- Digital voltmeter (DVM)
- Vectorscope (capable of measuring Differential Gain and Differential Phase)
- Waveform monitor (If waveform monitor is not available, oscilloscope can be used as a substitute.)
- Video signal generator (with built-in color bar, stairstep, modulated stairstep, convergence and sweep signals)
- 75 ohms termination plug
- Extension board (Part No. YWJ5500ZK13)

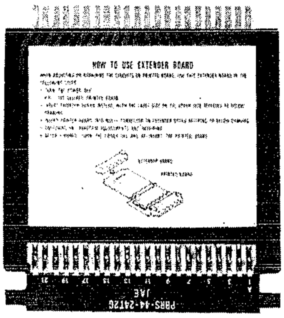


Fig. 1-1

2. DISASSEMBLING PROCEDURE

2-1 For Adjustment

- Shift the right side (red mark) of WIPE/MIX lever knob to right, and separated WIPE/MIX lever alternately.
- Remove two screws which hold the WIPE/MIX lever knobs. (Fig. 2-1-1)

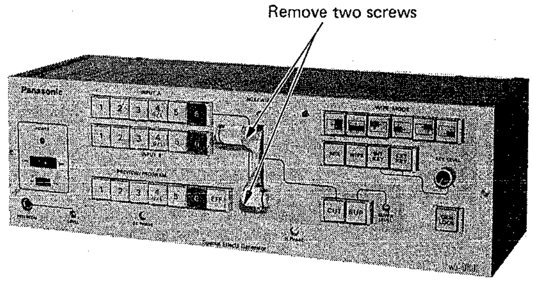


Fig. 2-1-1

- Pull out one knob on front panel.
- Remove four screws which hold the front panel and remove the front panel from S.E.G unit. (Fig. 2-1-2)

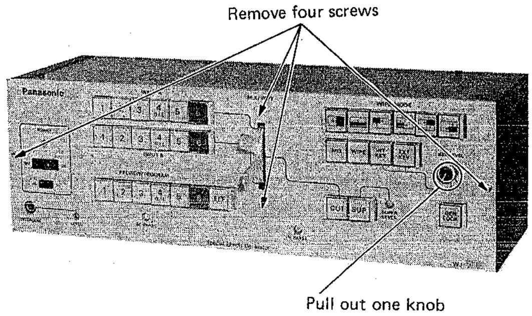


Fig. 2-1-2

- Remove the Hold plate from S.E.G unit. (Fig. 2-1-3)

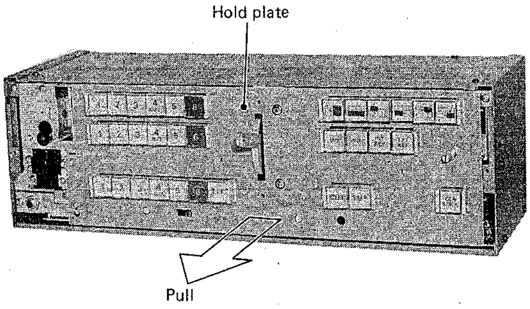


Fig 2-1-3

2-2 For Lever Unit

- Remove two screws which hold the Lever Unit and disconnect CN8 and CN9 on the Mother board. (Fig. 2-2-1, Fig. 2-2-2)

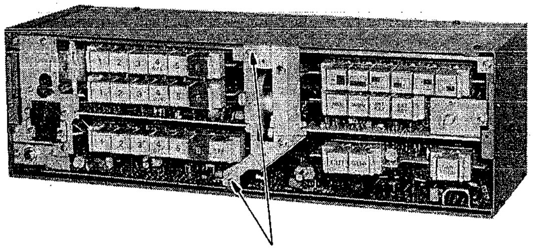

Remove two screws

Fig 2-2-1

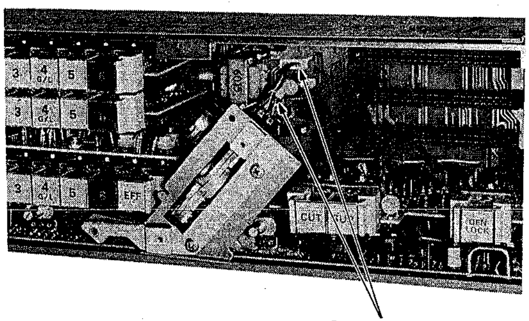

Remove two connectors

Fig. 2-2-2

2-3 For Rear Panel

- Remove four screws which hold the top panel and remove the top panel from S.E.G unit. (Fig. 2-3-1)
- Remove three screws which hold the rear panel. (Fig. 2-3-1)

Remove four screws

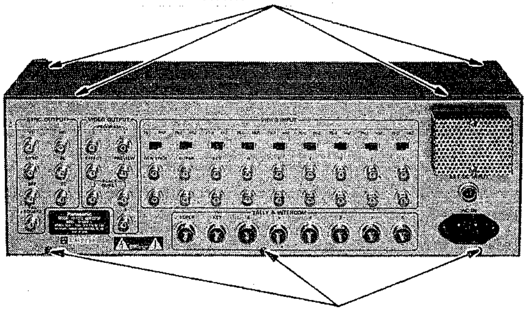

Remove three screws

Fig. 2-3-1

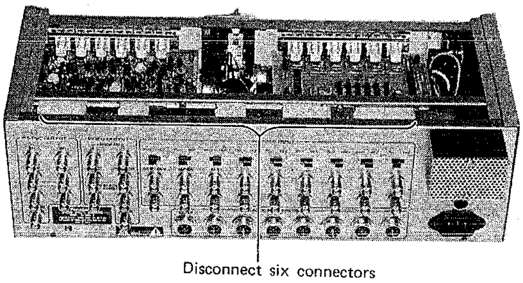

Disconnect six connectors

Fig. 2-3-2

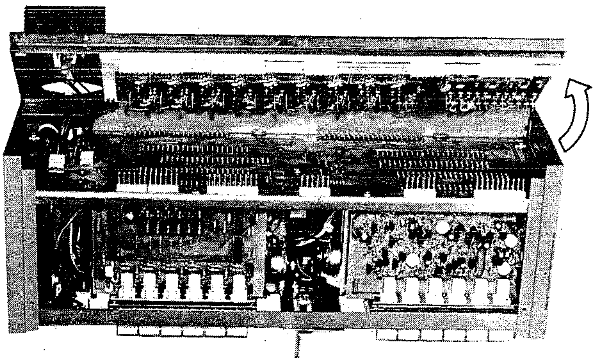


Fig. 2-3-3

3. ADJUSTMENT PROCEDURE

3-1 Connection and Setting Up for Adjustment

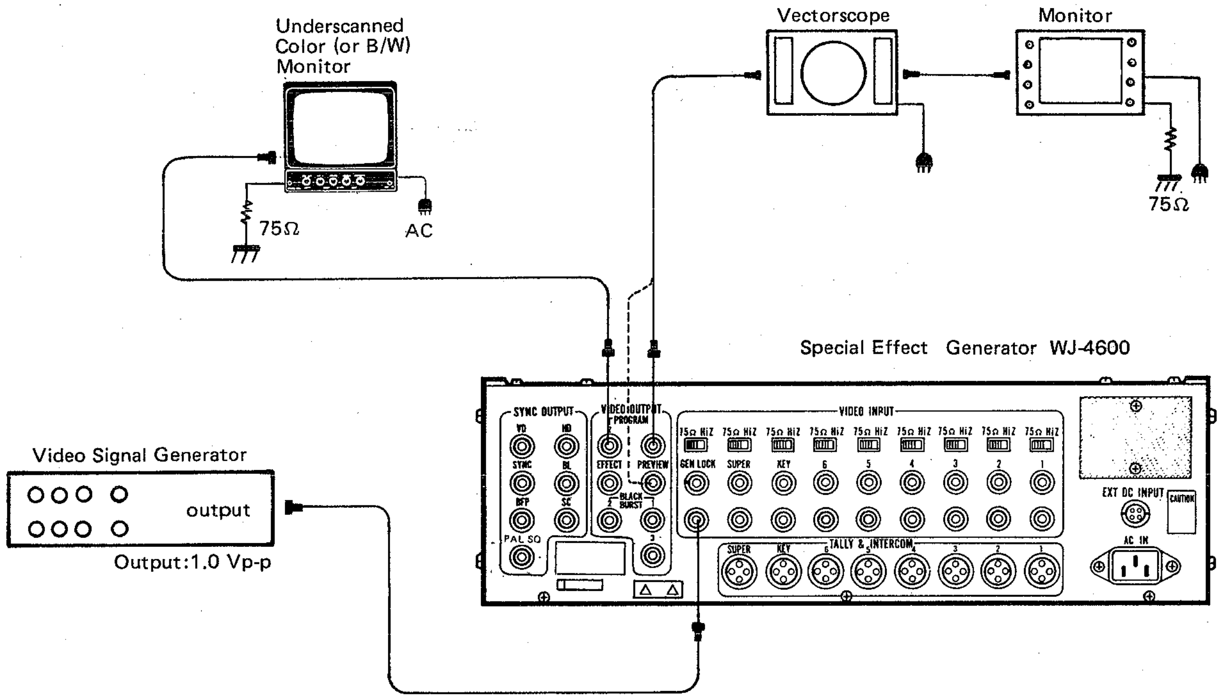

Underscanned
Color (or B/W)
Monitor
75Ω
AC
Vectorscope
Waveform
Monitor
75Ω
Special Effect Generator WJ-4600
Video Signal Generator
output
Output:1.0 Vp-p
SYNC OUTPUT
VD
HD
SYNC
BL
BFP
SC
PAL SQ
VIDEO OUTPUT
PROGRAM
2
1
EFFECT
PREVIEW
BLACK BURST
3
VIDEO INPUT
75Ω HiZ
GEN LOCK
SUPER
KEY
6
5
4
3
2
1
TALLY & INTERCOM
EXT DC INPUT
CAUTION
AC IN

Fig 3-1-1

Connection and Set-up

- Connect the coaxial cable between OUTPUT connector of video signal generator and the GEN-LOCK connector of WJ-4600.
- Set the video termination switch of Video Input 1 to 6 and GEN-LOCK to 75 ohms position.
- Connect the coaxial cable between PROGRAM-1 (or PREVIEW) OUTPUT of WJ-4600 and video input connector of underscanned color video monitor (or underscanned B/W video monitor) when instructed.
- Set the video termination switch of video monitor to 75 ohms position..
- Connect the coaxial cables between PROGRAM-2 (or PREVIEW) OUTPUT of WJ-4600 and video input of the waveform monitor through the vectorscope when instructed.
- Terminate the video input of the waveform monitor with 75 ohms.
- Set the GEN-LOCK ON/OFF switch to ON position.
- Turn ON the power switch of Special Effects Generator for at least 30 minutes prior to adjustment.

  Note : TP in the manual refers to a test point on the printed circuit board.

Extension board

- When adjusting, use the extension board Part No. YWJ5500ZK13 except Mother board.

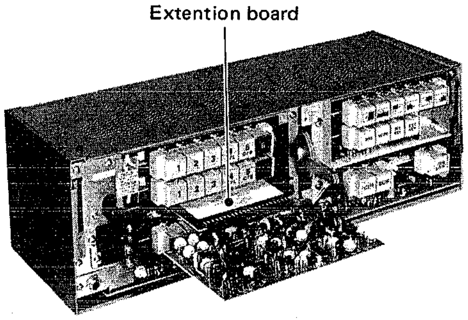

Extention board

Fig 3-1-2

Location of Printed Circuit Board

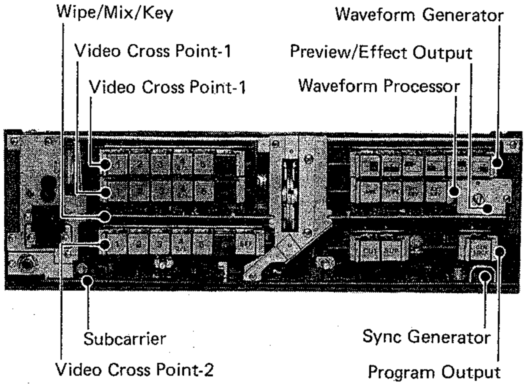
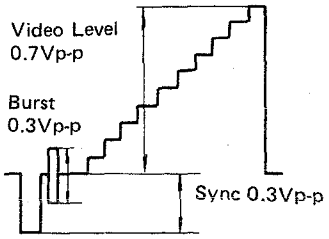
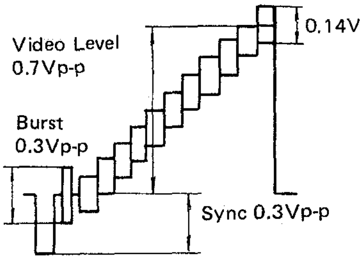
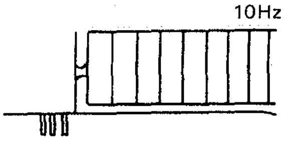
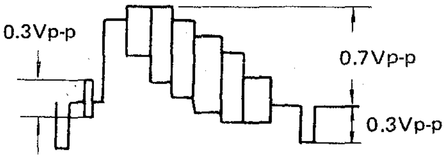
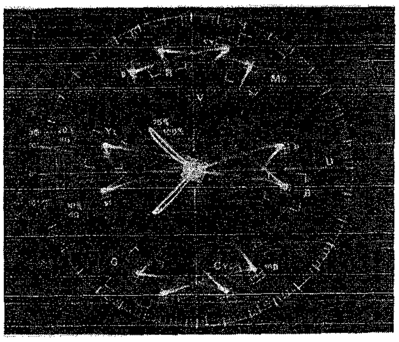

Wipe/Mix/Key
Video Cross Point-1
Video Cross Point-1
Waveform Generator
Preview/Effect Output
Waveform Processor
Subcarrier
Video Cross Point-2
Sync Generator
Program Output

Fig. 3-1-3

Select one of the following signals for adjustments.

Adjustment	Test Signal	Specified Level
Gain	Stairstep Signal with Burst	 Video Level 0.7Vp-p Burst 0.3Vp-p Sync 0.3Vp-p
DG, DP	Modulated Stairstep Signal	 0.14V Video Level 0.7Vp-p Burst 0.3Vp-p Sync 0.3Vp-p
Frequency Response	Sweep Signal	
Phase	Colour Bar Signal	 0.3Vp-p 0.7Vp-p 0.3Vp-p (a) Waveform  (b) Vectorscope

3-2. ADJUSTMENT

(1) MOTHER BOARD

- Refer to page 16 for test points and adjusting controls.

a) +9V Adjustment

Test point :	Pin 21 of CN22 on the Subcarrier Board
Adjust :	VR1 (+9V ADJ)

- Remove the Video Crosspoint-2 Board from the unit.
- Connect the digital voltmeter (DVM) to pin 21 of CN22 on the Subcarrier Board.
- Adjust VR1 (+9V ADJ) for +9V ± 0.02V.
- Place the Video Crosspoint-2 Board to the unit.

(2) SUBCARRIER BOARD

- Refer to page 7 for test points and adjusting controls.

a) Subcarrier Gain Adjustment

Test points :	TP3 SC Output Connector
Adjusts :	VR3 (SC LIMITER) VR5 (SC GAIN)

- Set the GEN-LOCK switch to the OFF position.
- Connect the oscilloscope to TP3.
- Adjust VR3 so that the SC (pulse) is 2 Vp-p.
- Connect the oscilloscope to the terminated (75Ω) SC output connector.
- Adjust VR5 so that the SC (sine wave) is 2 Vp-p.

(3) SYNC GENERATOR BOARD

- Refer to page 7 for test points and adjusting controls.

a) Subcarrier Frequency Adjustment

Test points :	SC Output Connector
Adjust :	VC2 (4.43MHz ADJ)

- Set the GEN-LOCK switch to the OFF position.
- Connect the frequency counter to the SC output connector.
- Adjust VC2 for 4.433619MHz ±3Hz.

b) Phase Lock Adjustment

Test points :	TP5 TP6 TP8
Adjust :	VC1 (PHASE LOCK)

- Keep setting the GEN-LOCK switch to the OFF position.
- Connect the digital voltmeter or oscilloscope to TP5.
- Adjust VC1 so that the voltage at TP5 is 6V DC.
- Confirm that the vertical pulse at TP6 is locked to the vertical drive (VD) pulse at TP8.

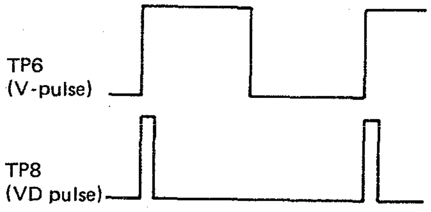


Fig. 3-2-1

c) Gen Lock VCO Adjustment

Test Point :	TP9
Adjust :	VC3 (VCO SET)

- Select the stairstep signal with burst at the video signal generator.
- Set the GEN-LOCK switch to the ON position.
- Connect the digital voltmeter or oscilloscope to TP 9 on the Sync Generator board.
- Adjust VC3 so that the voltage at TP 9 is 2V DC.

d) V. Reset Pulse Adjustment

Test Points :	GEN-LOCK Video Input Connector TP2 TP3
Adjusts :	VR1 (BURST DETECT) VR2 (V. RESET PHASE)

- Keep setting the GEN-LOCK switch to the ON position.
- Connect the oscilloscope to the GEN-LOCK video input connector and TP2.
- Trigger the oscilloscope at V. rate. (Use TP7 or pin 1 of IC3.)
- Use the delayed sweep mode to observe the first burst signal portion in the third field of gen-lock video signal.

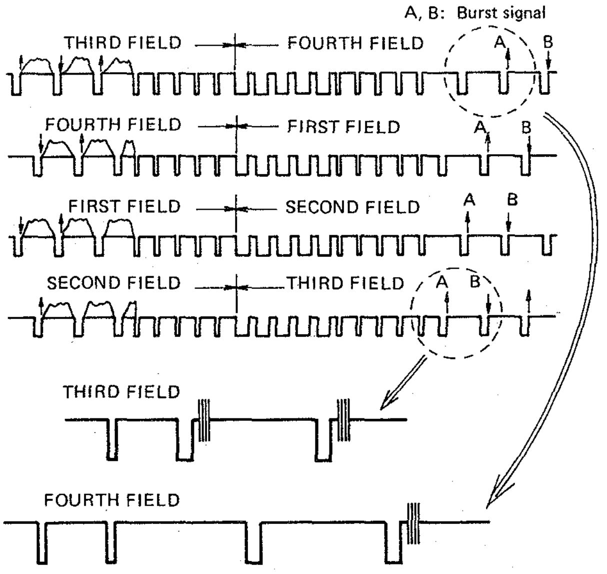


Fig. 3-2-2

- Adjust VR1 so that the decay timing of third field detection pulse positions as shown below.

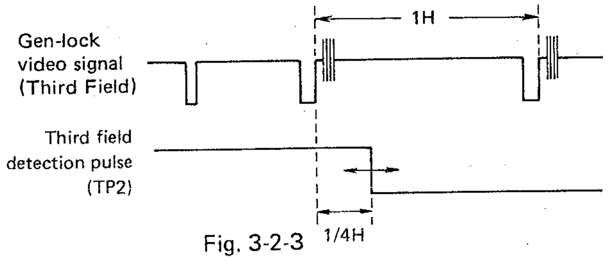

1H
Gen-lock video signal (Third Field)
Third field detection pulse (TP2)
1/4H

Fig. 3-2-3

- Remove the probe from TP2 and connect it to TP3.
- Use the delay sweep mode to observe the first burst signal portion in the fourth field of gen-lock video signal. (Refer to Fig. 3-2-2.)
- Adjust VR2 so that the V. reset pulse at TP3 positions as shown below.

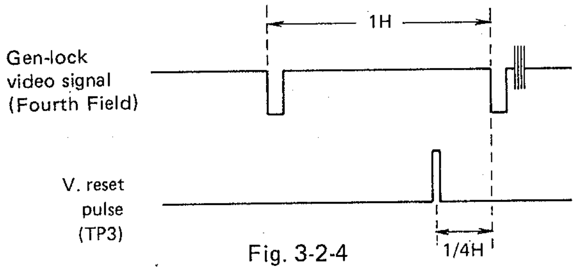

1H
Gen-lock video signal (Fourth Field)
V. reset pulse (TP3)
1/4H

Fig. 3-2-4

e) G/L H. Phase Adjustment

Test points :	GEN-LOCK Video Input Connector SYNC Output Connector
Adjust :	VR3 (G/L H. PHASE)

- Keep settting the GEN-LOCK switch to the ON position.
- Connect the oscilloscope to the GEN-LOCK video input connector and the SYNC output connector.
- Trigger the oscilloscope at H. rate.
- Confirm that the gen-lock sync signal at the GEN-LOCK video input connector leads by more than 0.5μsec and lags more than 1.5μsec the sync signal at the SYNC output connector as VR3 is turned through its range.

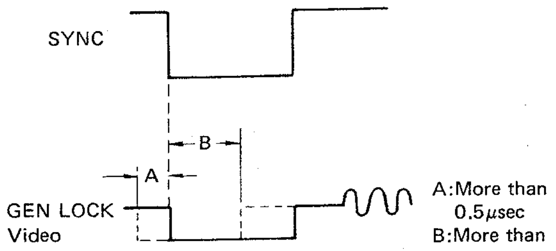

SYNC
B
A
GEN LOCK Video
A:More than 0.5μsec
B:More than 1.5μsec

Fig. 3-2-5

- After confirming the above step, adjust VR3 until the leading edges of both signals are coincident.

(4) SUBCARRIER BOARD

- Refer to page 7 for test points and adjusting controls.

b) G/L Subcarrier Lock Adjustment

Test points :	Subcarrier Output of Video Signal Generator TP1
Adjust :	VR1 (G/L SC LOCK)

- Set the GEN-LOCK switch to the ON.
- Connect the oscilloscope to TP1 and the subcarrier output of video signal generator which supplies the gen-lock signal.
- Trigger the oscilloscope at SC rate. (Use SC output of video signal generator.)
- Adjust VR1 until the SC signal at TP1 is locked and its amplitude is maximum.
- Comfirm that the minimum subcarrier jitter on the vectorscope, if not, readjust VR1.

c) G/L Subcarrier Phase Confirmation

Test points :	Subcarrier Output of Video Signal Generator TP2
Adjust :	VR2 (G/L SC PHASE)

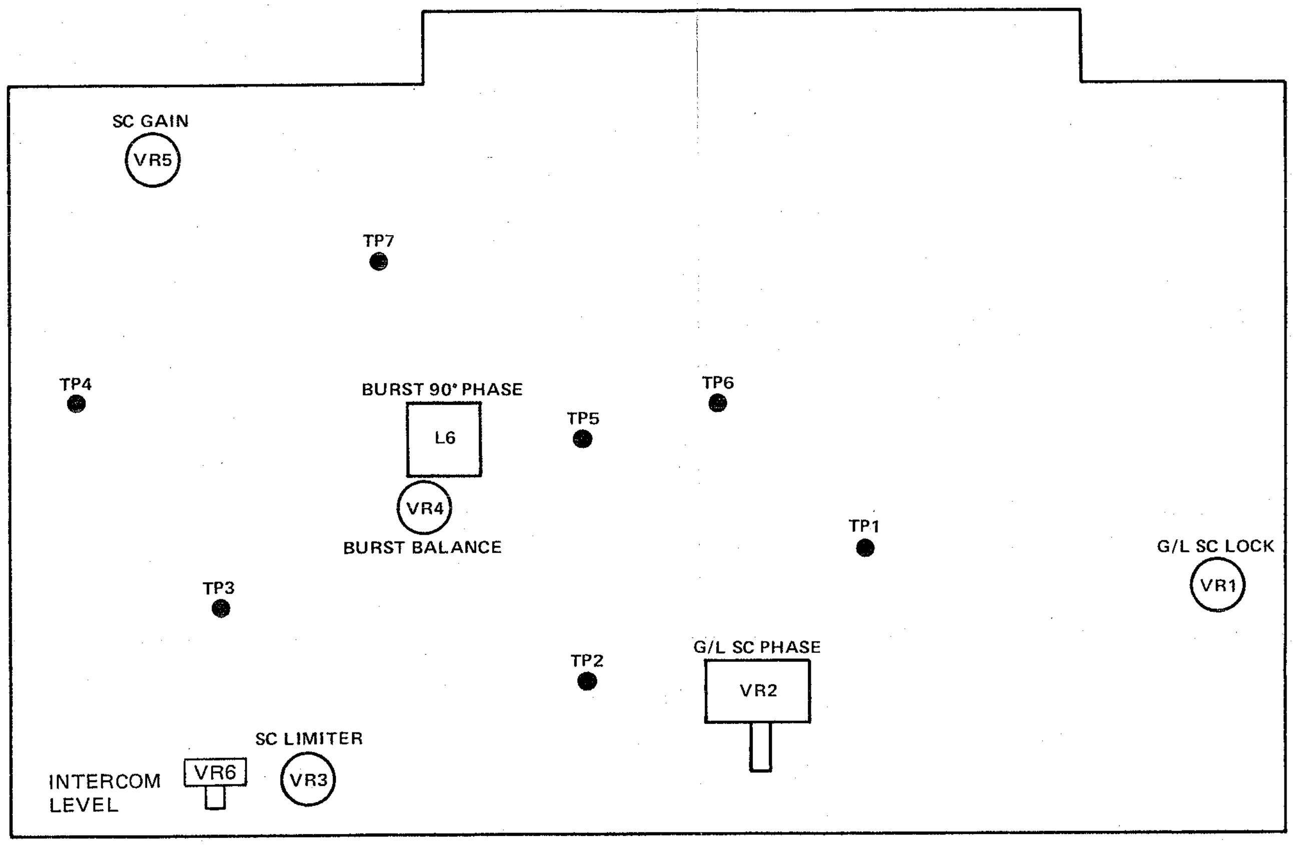
- Keep setting the GEN-LOCK switch to the ON position.
- Connect the Oscilloscope to TP2 and the subcarrier output of video signal generator.
- Trigger the oscilloscope at SC rate. (Use SC output of video signal generator.)
- Confirm that the subcarrier at TP2 shifts more than one cycle (360°) as VR2 is turned through its range.
- After confirming the above step, adjust VR2 until both subcarrier signals match in phase.

d) Burst Phase and Balance Adjustment

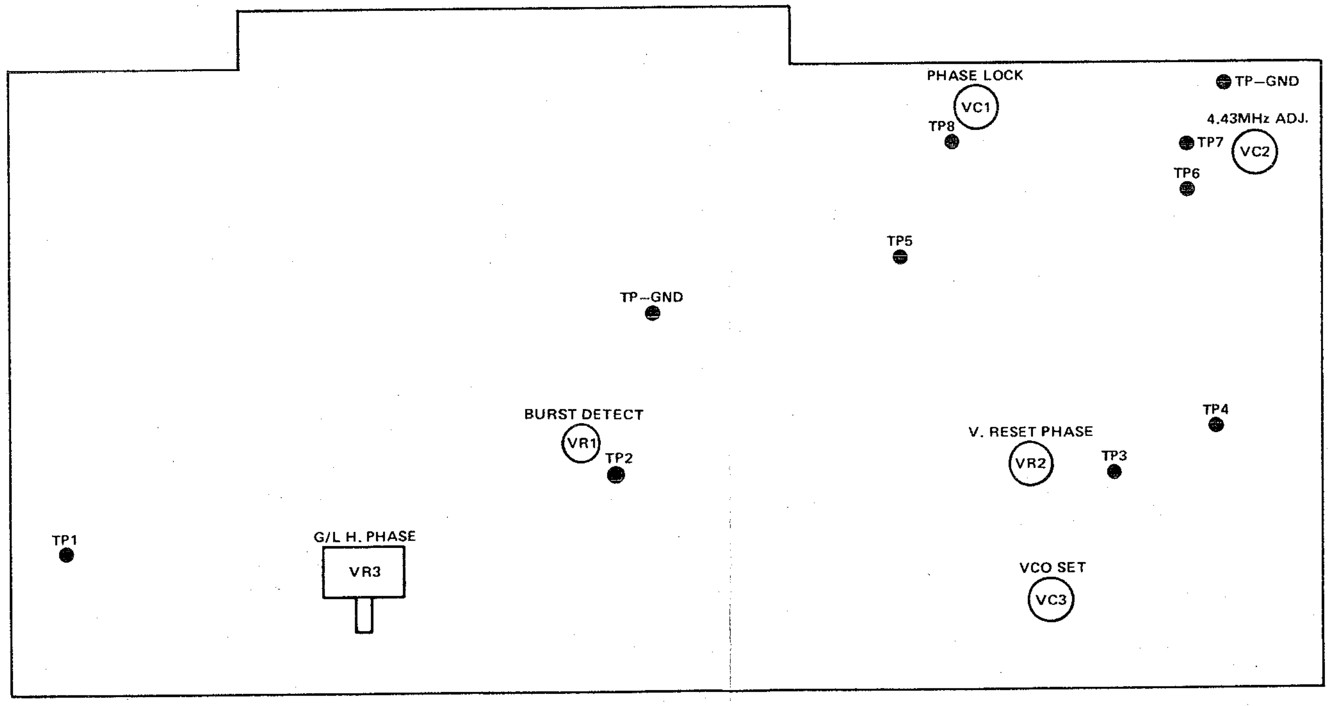
Observe :	Vectorscope
Adjusts :	L6 (BURST 90° PHASE) VR4 (BURST BALANCE)

- Reset the GEN-LOCK switch to the OFF position.
- Connect the BLACK BURST output connector to the vectorscope.
- While observing the burst vectors on the vectorscope, adjust L6 and VR4 alternately until the burst vectors position on the burst axes and their amplitude becomes equal on the vectorscope.

LOCATION OF TEST POINTS AND CONTROLS


SC GAIN
VR5
TP7
TP4
BURST 90° PHASE
L6
TP5
TP6
VR4
BURST BALANCE
TP1
G/L SC LOCK
VR1
TP3
TP2
G/L SC PHASE
VR2
SC LIMITER
INTERCOM LEVEL
VR6
VR3

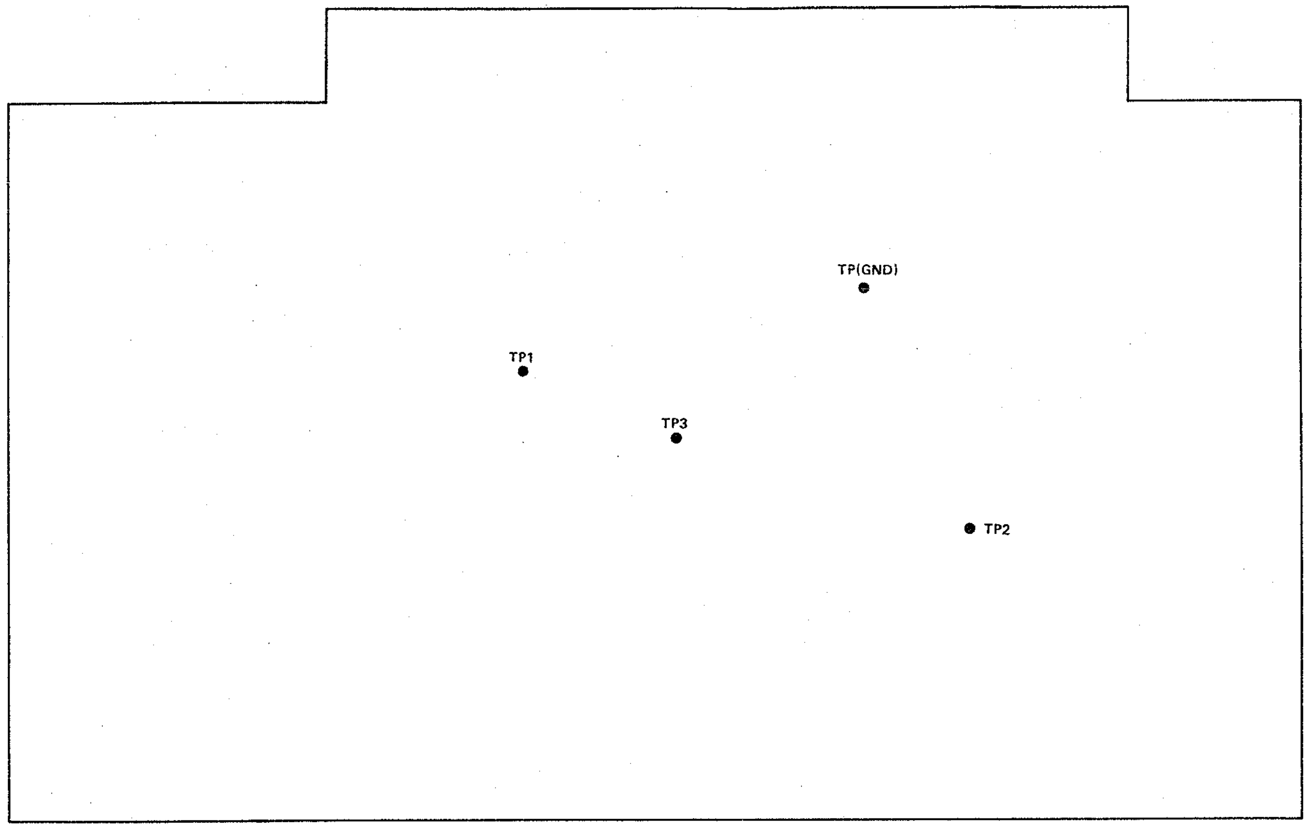
SUBCARRIER BOARD


PHASE LOCK
VC1
TP8
TP-GND
4.43MHz ADJ.
TP7
VC2
TP6
TP5
TP-GND
BURST DETECT
VR1
TP2
V. RESET PHASE
VR2
TP3
TP4
TP1
G/L H. PHASE
VR3
VCO SET
VC3

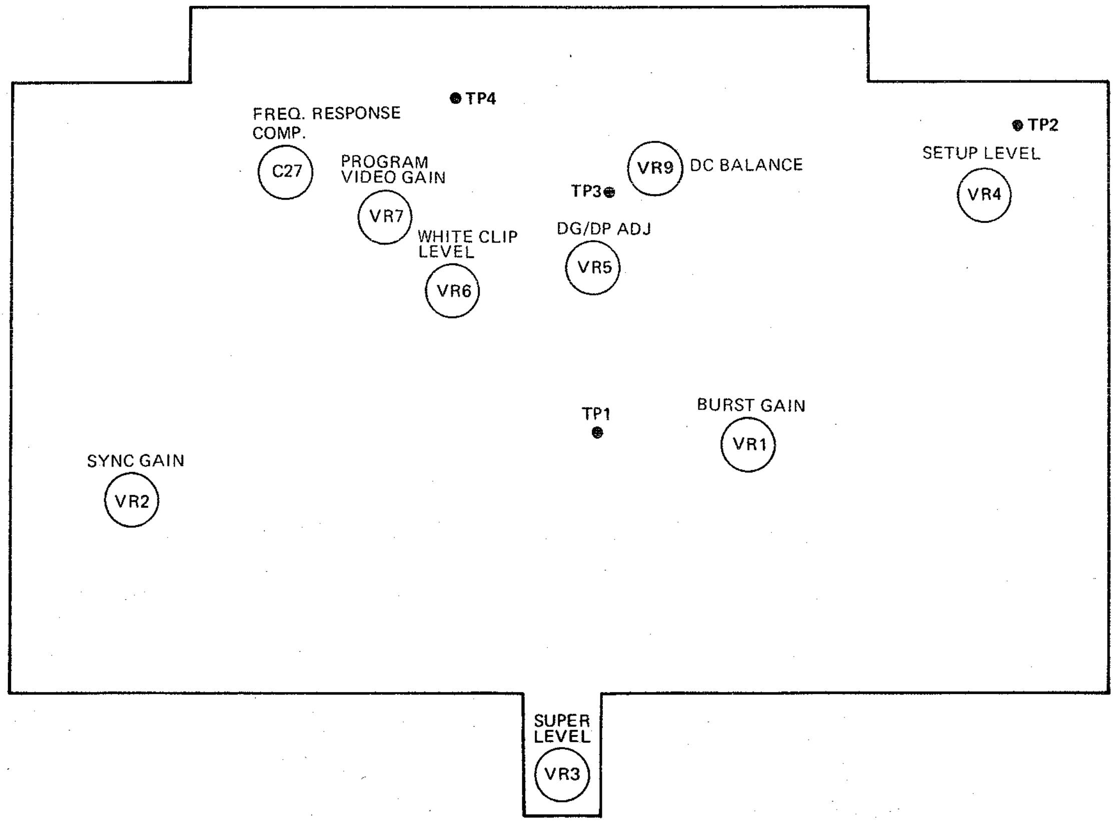
SYNC GENERATOR BOARD

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

WAVEFORM PROCESSOR BOARD


TP(GND)
TP1
TP3
TP2

PROGRAM OUTPUT BOARD


TP4
FREQ. RESPONSE COMP.
C27
PROGRAM VIDEO GAIN
VR7
WHITE CLIP LEVEL
VR6
VR9
DC BALANCE
TP3
DG/DP ADJ
VR5
TP2
SETUP LEVEL
VR4
TP1
BURST GAIN
VR1
SYNC GAIN
VR2
SUPER LEVEL
VR3

(5) WAVEFORM PROCESSOR BOARD

- Refer to page 8 for test points.

a) Vertical Interval Switching Pulse Confirmation

Test points:	TP1
	VD OUTPUT connector

- Trigger the oscilloscope at V rate.
- Connect the oscilloscope to the terminated (75 ohms) VD output connector and to the TP1.
- Confirm that the vertical interval switching pulse at TP1 is as shown below.

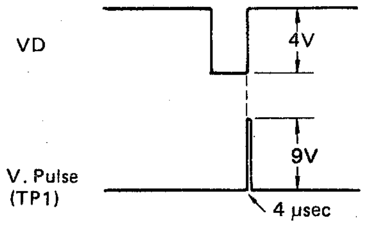

VD
4V
9V
V. Pulse
(TP1)
4 μsec

Fig. 3-2-6

b) Positive SYNC Confirmation

Test points:	TP2
	SYNC OUTPUT connector

- Trigger the oscilloscope at H rate.
- Connect the oscilloscope to the terminated (75 ohms) SYNC output connector and to the TP2.
- Confirm that the positive SYNC pulses appears at TP2.

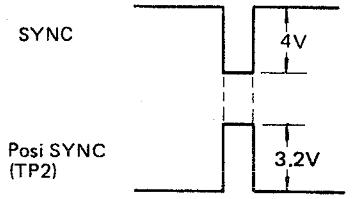

SYNC
4V
Posi SYNC
(TP2)
3.2V

Fig 3-2-7

c) Clamp Pulse Confirmation

Test points:	TP3
	BFP OUTPUT connector

- Trigger the oscilloscope at H rate.
- Connect the oscilloscope to TP3 and BFP output connector.
- Confirm that the clamp pulse appears at TP3.

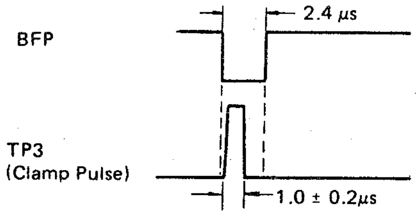

2.4 μs
BFP
TP3
(Clamp Pulse)
1.0 ± 0.2μs

Fig. 3-2-8

(6) PROGAM OUTPUT BOARD

- Refer to page 8 for test points and adjusting controls.
- Connect the waveform monitor and vectorscope to PROGRAM output connector.

a) DC Balance Adjustment

Test points:	TP1
	TP3
Adjust:	VR9 (DC BALANCE)

- DC couple the oscilloscope.
- Connect the oscilloscope to TP1 and TP3.
- Adjust VR9 so that the DC voltage at TP3 is equal to that of TP1.

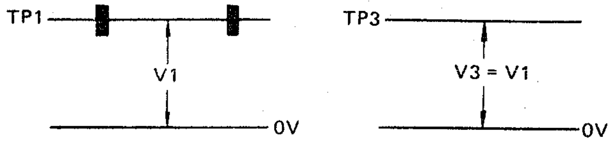

TP1
V1
0V
TP3
V3 = V1
0V

Fig. 3-2-9

b) Adjustment of Gain, Setup, Sync, Burst, DC Balance and DG, DP for Program Output

Observe:	Waveform Monitor Vectorscope
Adjusts:	VR1 (BURST GAIN) VR2 (SYNC GAIN) VR4 (SETUP LEVEL) VR5 (DG/DP ADJ) VR7 (PROGRAM VIDEO GAIN)

- Select the stairstep signal on the video signal generator.
- Set the GEN LOCK switch to the ON position.
- Set the CUT switch to the ON position.
- Select the No. 4 (G/L) position on the preview/program selector.
- Turn VR6 (WHITE CLIP LEVEL) fully clockwise.
- Adjust VR7 so that the stairstep signal is 0.7Vp-p From blanking level to the top step.
- Adjust VR4 so that the setup level is equal to blanking level.
- Adjust VR2 so that the sync signal is 0.3Vp-p.
- Adjust VR1 so that the burst signal is 0.3Vp-p.

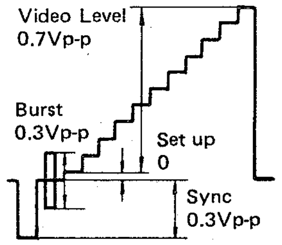

Video Level
0.7Vp-p
Burst
0.3Vp-p
Set up
0
Sync
0.3Vp-p

Fig 3-2-10

- Select the modulated stairstep signal on the video signal generator.
- Set the vectorscope to DIFF GAIN mode.
- Adjust VR5 so that differential gain becomes less than 2.0%.
- Set the vectorscope to DIFF PHASE mode.
- Confirm that differential phase is less than 2.0°. If it is not, readjust VR5 so that the differential phase becomes less than 2.0%.
- Repeat DG, DP adjustment until differential gain becomes less than 2.0% and differential phase becomes less than 2.0°.
- Repeat the level adjustments until each level is as satisfied in the Fig. below.

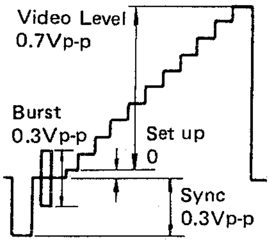


Fig. 3-2-11

c) Frequency Response Adjustment

Observe:	Waveform Monitor
Adjust:	C27 (FREQ. RESPONSE COMP.)

- Select the 10MHz sweep video signal range at video signal generator.
- Set the CUT switch to the OFF position.
- Select WIPE mode on the function selector.
- Select the wipe mode ◨.
- Set the MIX/WIPE lever to the lower position.
- Select the No. 4 (G/L) position on A and B inputs.
- Adjust C27 so that frequency response is within +1dB, -3dB at 10MHz.

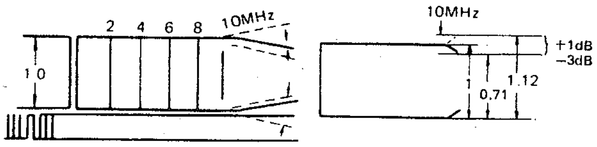


Fig. 3-2 12

- Readjust VR1 so that burst signal is 0.3Vp-p.

d) White Clipper Adjustment

Observe:	Waveform Monitor
Adjust:	VR6 (WHITE CLIP LEVEL)

- Select the stairstep signal at video signal generator.
- Set the CUT switch to the OFF position.
- Select MIX mode on the function selector.
- Select the No. 4 (G/L) position on A and B inputs.
- Separate the MIX/WIPE levers (set the left lever to the upper and right lever to the lower position).
- Adjust VR6 so that video signal will be clipped at 0.8Vp-p.

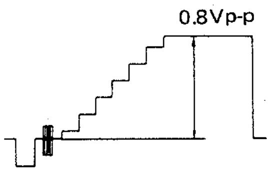


Fig. 3-2-13

(7) WIPE/MIX/KEY BOARD

- Refer to page 15 for test points and adjusting controls.

a) Adjustment of the Difference of Phase Between MIX and WIPE.

Observe:	Vectorscope
Adjusts:	VR2 (WIPE PHASE)
	VR9 (MIX PHASE)

- Select color bar signal of the video signal generator.
- Select No. 4 (G/L) on A and B inputs.
- Select EFF on the PREVIEW/PROGRAM selector
- Select MIX mode on the function selector
- Set the MIX/WIPE lever to the lower position.
- Set the GEN. LOCK switch to ON.
- Adjust VR2 (GEN LOCK SC PHASE) on the SUBCARRIER BOARD for proper burst phase on the vectorscope.
- Select WIPE mode on the function selector.
- Adjust VR9 so that the color bar vectors fall in to their respective boxes on the vectorscope. (Confirm that the color bar vectors do not change by switching MIX and WIPE mode of the function selector.)

- Set the MIX/WIPE lever to the upper position.
- Select MIX mode on the function selector.
- Set the color bar vectors for proper position on the vectorscope by adjusting phase control on the vectorscope.
- Select WIPE mode on the function selector.
- Adjust VR2 so that the color bar vectors fall into proper positions on the vectorscope.
  (Confirm that the color bar vectors do not change by switching MIX and WIPE mode of the function selector.)

b) Bias Adjustment for IC1, IC2 and IC3.

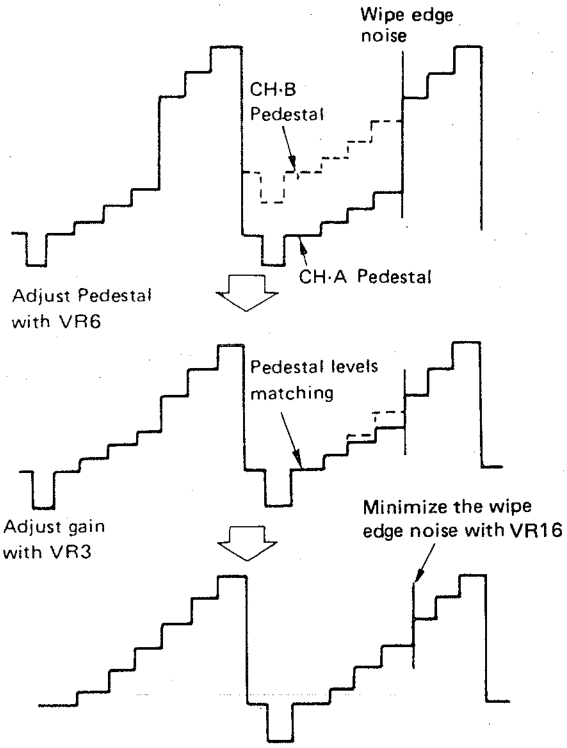
Test Points:	TP5 TP6 TP9
Adjusts:	VR10 (+5V SET) VR11 (DC BALANCE)

- Select No. 6 (NO video) on A and B inputs.
- DC couple the oscilloscope.
- Connect the oscilloscope to TP9 and TP6.
- Adjust VR11 so that DC voltage at TP6 is equal to that of TP9.
- Connect the DVM to TP5.
- Adjust VR10 for +5V DC.

c) WIPE Pedestal Level and Gain Adjustment.

Observe:	Waveform Monitor
Adjusts:	VR3 (WIPE A GAIN) VR6 (WIPE A PEDESTAL) VR16 (WIPE EDGE COMP.)

- Select stairstep signal of the video signal generator.
- Select No. 4 (G/L) on A and B inputs.
- Select WIPE on the function selector.
- Select the wipe mode ↑▨.
- Set the MIX/WIPE lever to the Center position.
- Set the GEN. LOCK switch to ON.
- Adjust VR3 and VR6 so that the input A and input B signals become the same in level and pedestal as shown in Fig. 3-2-14.
- Repeat adjustments the VR3 and VR6 until input A and input B signals the same in level and pedestal.
- Select the wipe mode →▨
- Adjust VR16 so that the wipe edge noise becomes minimum. (Fig. 3-2-14).



Pedestal and gain matching

Fig. 3-2-14

d) Adjustment of the Difference of DC Level Between EFF. and PREVIEW.

Test point:	TP2 (on the PREVIEW/EFF OUTPUT BOARD)
Adjust:	VR17 (EFF/PREVIEW DC BALANCE)

- DC couple the oscilloscope.
- Connect the oscilloscope to TP2 on the PREVIEW/EFF OUTPUT BOARD.
- Select No. 4 (G/L) on A, B and PREVIEW/PROGRAM inputs.
- Select WIPE on the function selector.
- Set the MIX/WIPE lever to the lower position.
- Set the CUT switch to ON.
- Read the DC voltage of setup level at TP2.
- Reset the CUT switch to OFF.
- Adjust VR17 so that the DC voltage of setup level becomes same as when the CUT switch was ON.
  (Confirm that the DC voltage of setup level do not change by switching the CUT switch ON and OFF.)

e) Gain and DG, DP for Effect Adjustment.

Observes:	Waveform Monitor Vectorscope
Adjusts:	VR4 (EFF VIDEO GAIN) VR5 (DG/DP ADJ.)

- Connect the waveform monitor and vectorscope to PROGRAM OUTPUT connector.
- Select stairstep signal of the video signal generator.
- Select No. 4 (G/L) on A and B inputs.
- Select EFF on the PREVIEW/PROGRAM selector.
- Select WIPE on the function selector.
- Select the wipe mode ▨.
- Set the CUT switch to ON.
- Set the GEN. LOCK switch to ON.
- Set the MIX/WIPE lever to the lower position.
- Read the Output level from setup to top step.
- Set the CUT switch to OFF.
- Adjust VR4 so that the output level becomes same as when the CUT switch was ON.

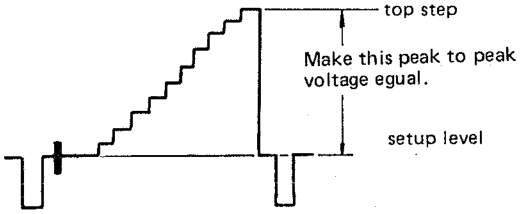


Fig. 3-2-15

- Select modulated stairstep signal of the video signal generator.
- Set the vectorscope to DIFF. GAIN mode.
- Adjust VR5 so that the differential gain becomes less than 2.0%.
- Set the vectorscope to DIFF PHASE mode.
- Confirm that the differential phase is less than 2.0°, if it is not, readjust VR5 so that the differential phase becomes less than 2.0°.
- Repeat DG, DP adjustment until differential gain becomes less than 2.0% and differential phase becomes less than 2.0°.
- Readjust VR4 so that output level does not change by switching the CUT switch ON/OFF.

f) Adjustment of the Difference of Gain and DC Level Between MIX and WIPE.

Observe:	Waveform Monitor
Adjusts:	VR7 (MIX VIDEO GAIN) VR18 (MIX/WIPE DC BALANCE)

- Connect the waveform monitor to PROGRAM output connector.
- Set the waveform monitor to DC couple.
- Select stairstep signal of the video signal generator.
- Select No. 4 (G/L) on A and B inputs.
- Select WIPE on the function selector.
- Set the MIX/WIPE lever to the lower position.
- Set the GEN. LOCK switch to ON.
- Read DC voltage of setup level.
- Change to MIX mode on the function selector.
- Adjust VR18 so that the DC voltage of setup level becomes same as when WIPE mode was selected on the function selector.
- Reselect WIPE on the function selector.
- Read output level.
- Change to MIX mode on the function selector.
- Adjust VR7 so that the output level becomes same as when WIPE mode was selected on the function selector.

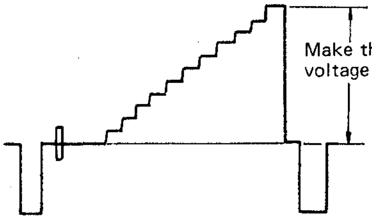


Fig. 3-2-16

g) MIX Gain Adjustment.

Observe:	Waveform Monitor
Adjust:	VR1 (MIX A GAIN)

- Connect the waveform monitor to PROGRAM output connector.
- Select stairstep signal of the video signal generator.
- Select No. 4 (G/L) on A and B inputs.
- Select MIX on the function selector.
- Set the MIX/WIPE lever to the lower position.
- Set the GEN. LOCK switch to ON.
- Read output level.
- Set the MIX/WIPE lever to the upper position.
- Adjust VR1 so that output level becomes same as when the MIX/WIPE lever was at lower position.

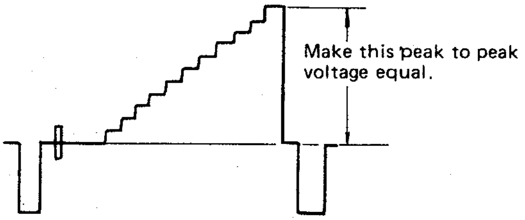


Fig. 3-2-17

h) Adjustment of DG, DP for Effect Output.

Observes:	Waveform Monitor Vectorscope
Adjusts:	VR8 (DG/DP ADJ)

- Connect the waveform monitor and vectorscope to PROGRAM output connector.
- Select modulated stairstep signal of the video signal generator.
- Select No. 4 (G/L) on A and B inputs.
- Select EFF on the PREVIEW/PROGRAM selector.
- Select MIX on the function selector.
- Set the MIX/WIPE lever to the lower position.
- Set the GEN. LOCK switch to ON.
- Set the CUT switch to ON.
- Set the vectorcope to DIFF. GAIN mode.
- Adjust VR8 so that the differential gain becomes less than 2.0%.
- Set the vectorscope to DIFF PHASE mode.
- Confirm that the differential phase is less than 2.0°, if it is not, readjust VR8 so that the differential phase becomes less than 2.0°.
- Repeat DG, DP adjustment until differential gain becomes less than 2.0% and differential phase becomes less than 2.0°.
- If it is not, set VR8 at best position then readjust VR11 so that the DG and DP becomes less than 2.0% and 2.0°.
- Set the MIX/WIPE lever to the upper position.
- Confirm that the differential gain is less than 2.0% and differential phase is less than 2.0°.

i) MIX/WIPE Lever Limit Adjustment.

Observe:	Waveform Monitor
Adjusts:	VR12 (MIX A FAD. FINE 1) VR13 (MIX A FAD. FINE 2) VR14 (MIX B FAD. FINE 1) VR15 (MIX B FAD. FINE 2)

- Connect the waveform monitor to PROGRAM output connector.
- Select stairstep signal of the video signal generator.
- Select No. 6 (No. Video) at input A.
- Select No. 4 (G/L) at input B.
- Select MIX on the function selector.
- Set the GEN. LOCK switch to ON.
- Adjust VR15 so that the waveform becomes 0.7Vp-p with the MIX/WIPE level at the lower position.
- If it is not, readjust VR7 so that the output becomes 0.7Vp-p.
- Adjust VR14 so that the waveform becomes 0.35Vp-p with the MIX/WIPE level at the center position.

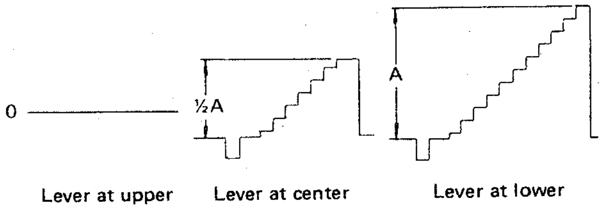


Fig. 3-2-18

- Select No. 4 (G/L) at input A.
- Select No. 6 (No. Video) at input B.
- Adjust VR12 and VR13 so that the waveform becomes 0.35Vp-p with the MIX/WIPE level at the center position.

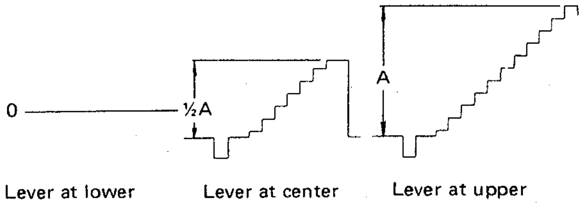


Fig. 3-2-19

- Select No. 4 (G/L) on both A and B inputs.
- Confirm that the output waveform stays same level with the MIX/WIPE lever operates from upper to lower and lower to upper position. If not, readjust VR12, VR13, VR14 and VR15 until stays same.

(8) PREVIEW/EFFECT OUTPUT BOARD

- Refer to page 15 for test points and adjusting controls.

a) Adjustment of SYNC Sepa for Preview

Test point:	TP5
Adjust:	VR5 (SYNC SEPA LEVEL)

- Select the stairstep signal on the video signal generator.
- Set the GEN LOCK switch to the ON position.
- Select the No. 4 (G/L) position on the preview/program selector.
- Connect the oscilloscope to TP5.
- Trigger the oscilloscope at H rate.
- Adjust VR5 so that sync signal becomes approx. 0.18Vp-p.

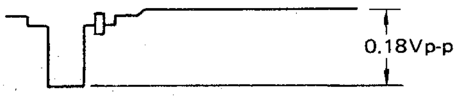


Fig. 3-2-20

b) Adjustment of Gain and DG, DP for Preview Output.

Observe:	Waveform Monitor
Adjusts:	VR2 (PREVIEW VIDEO GAIN) VR3 (DG/DP ADJ) C11 (FREQ. RESPONSE COMP.)

- Connect the waveform monitor and vectorscope to PREVIEW output connector.
- Set the CUT switch to the OFF position.
- Set the GEN LOCK switch to the ON position.
- Select the No. 4 (G/L) position on the preview/program selector.
- Select the stairstep signal on the video signal generator.
- Adjust VR2 so that the stairstep signal becomes 0.7Vp-p from setup level to the top step.

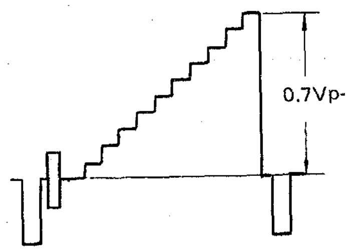


Fig. 3-2-21

- Select the modulated stairstep signal on the video signal generator.
- Set the vectorscope to the DIFF GAIN mode.
- Adjust VR3 so that differential gain becomes less than 2.0%.
- Set the vectorscope to the DIFF PHASE mode.
- Confirm that the differential phase is less than 2.0°. If it is not, readjust VR3 so that differential phase becomes less than 2.0°
- Repeat DG, DP adjustment until differential gain becomes less than 2.0% and differential phase becomes less than 2.0°.
- Readjust VR2 so that the stairstep signal becomes 0.7Vp-p.
- Select the 10MHz signal sweep range in the video signal generator.
- Adjust C11 so that frequency response becomes within +1dB, -3dB at 10MHz.

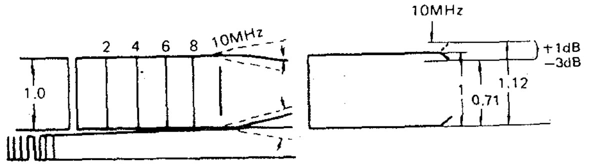


Fig. 3-2-22

c) Adjustment of Gain and DG, DP for Effect Output

Observes:	Waveform Monitor Vectorscope
Adjusts:	VR6 (EFF VIDEO GAIN) VR7 (DG/DP ADJ) C20 (FREQ. RESPONSE COMP.)

- Connect the waveform monitor and vectorscope to EFF output connector.
- Set the GEN LOCK switch to the ON position.
- Select the No. 4 (G/L) position on A and B inputs.
- Select WIPE mode on the function selector.
- Select the wipe mode ◨.
- Set the MIX/WIPE lever to the lower position.
- Select the stairstep signal on the video signal generator.
- Adjust VR6 so that the stairstep signal becomes 0.7Vp-p from setup level to the top step.

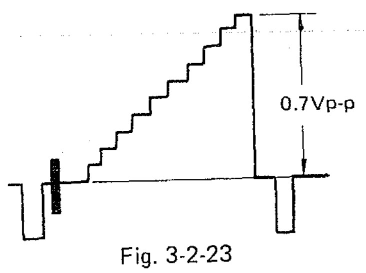


Fig. 3-2-23

- Select the modulated stairstep signal on the video signal generator.
- Set the vectorscope to the DIFF GAIN mode.
- Adjust VR7 so that differential gain becomes less than 2.0%.
- Set the vectorscope to the DIFF PHASE mode.
- Confirm that differential phase is less than 2.0°. If it is not, readjust VR7 so that it becomes less than 2.0°.
- Repeat DG, DP adjustment until differential gain becomes less than 2.0% and differential phase becomes less than 2.0°.
- Readjust VR6 so that the stairstep signal becomes 0.7Vp-p.
- Select the 10MHz sweep signal range in the video signal generator.
- Adjust C20 so that frequency response becomes within +1dB, -3dB at 10MHz.

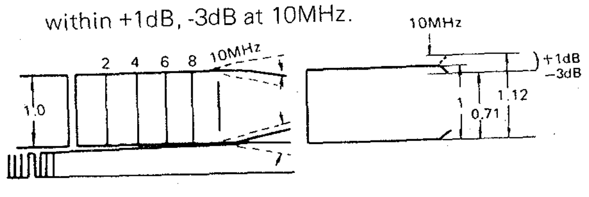
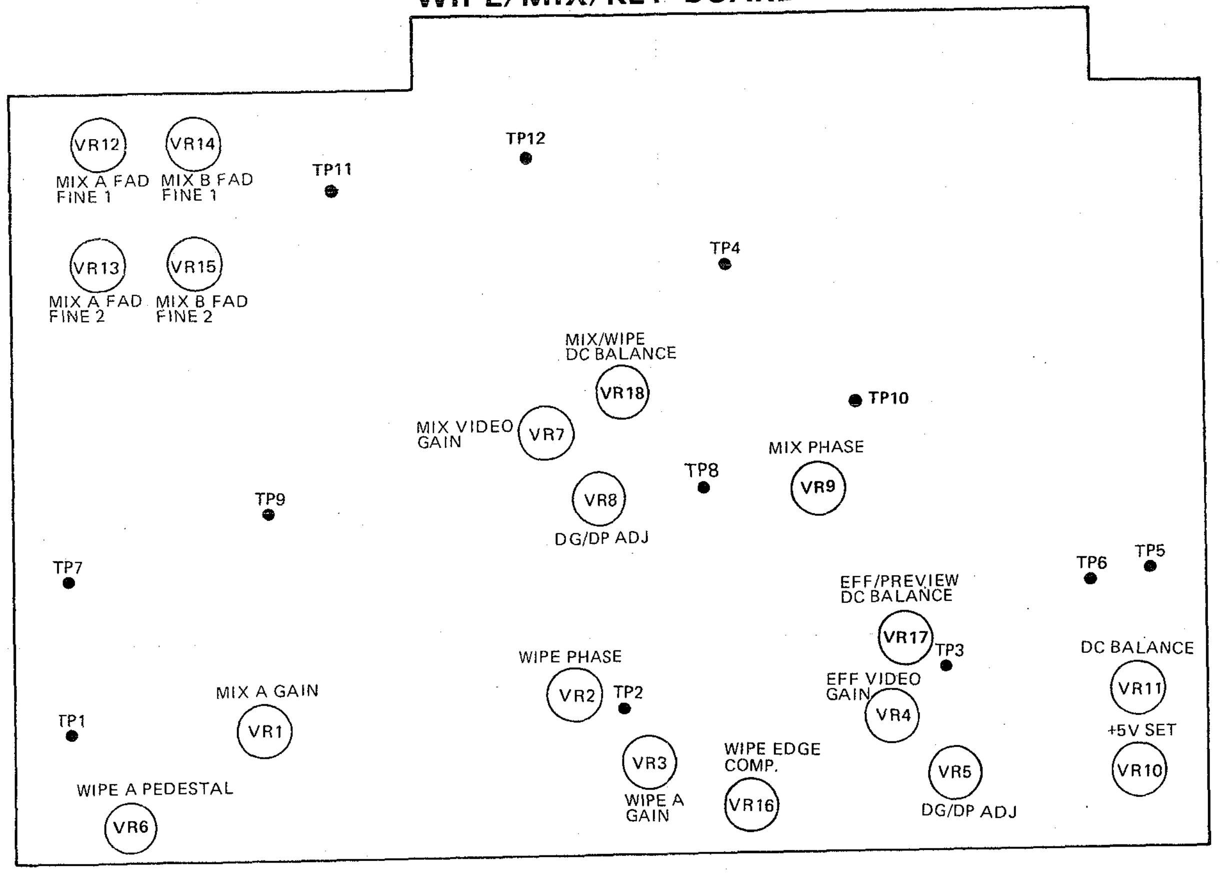


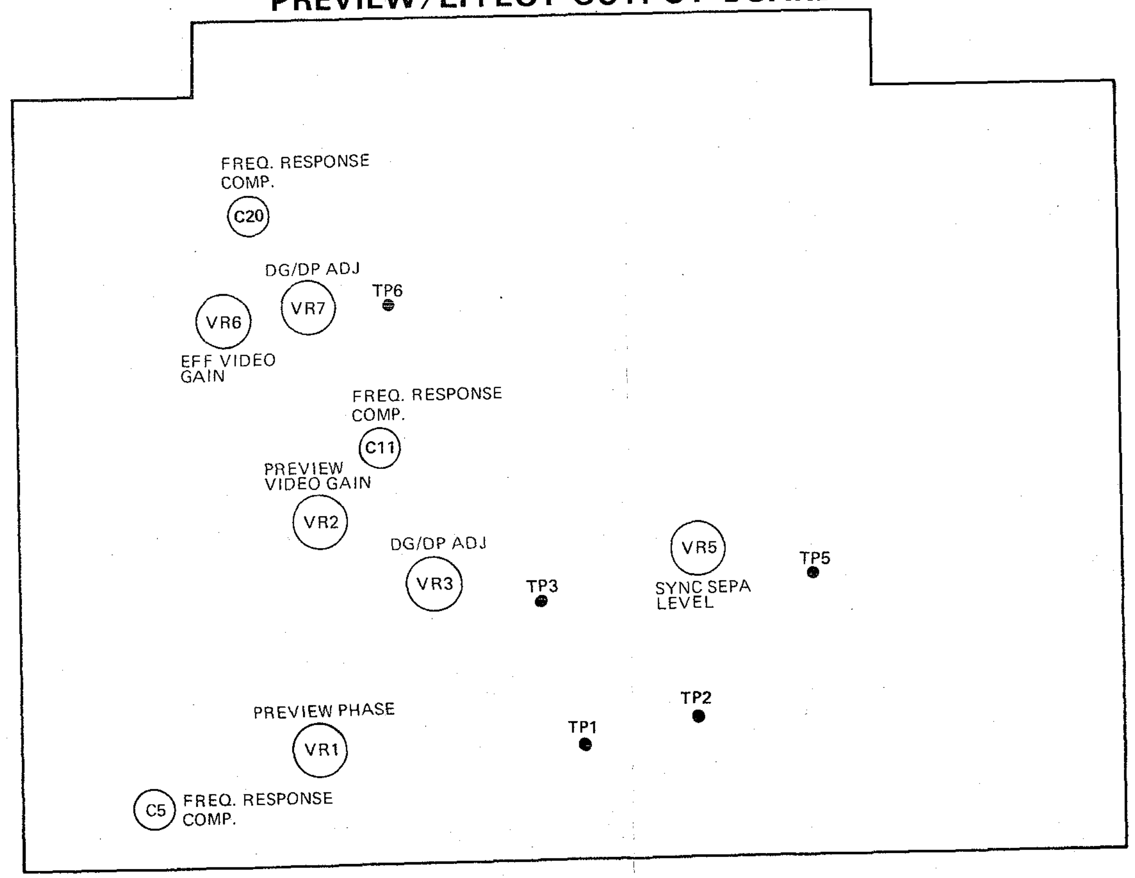
Fig. 3-2-24

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

WIPE/MIX/KEY BOARD

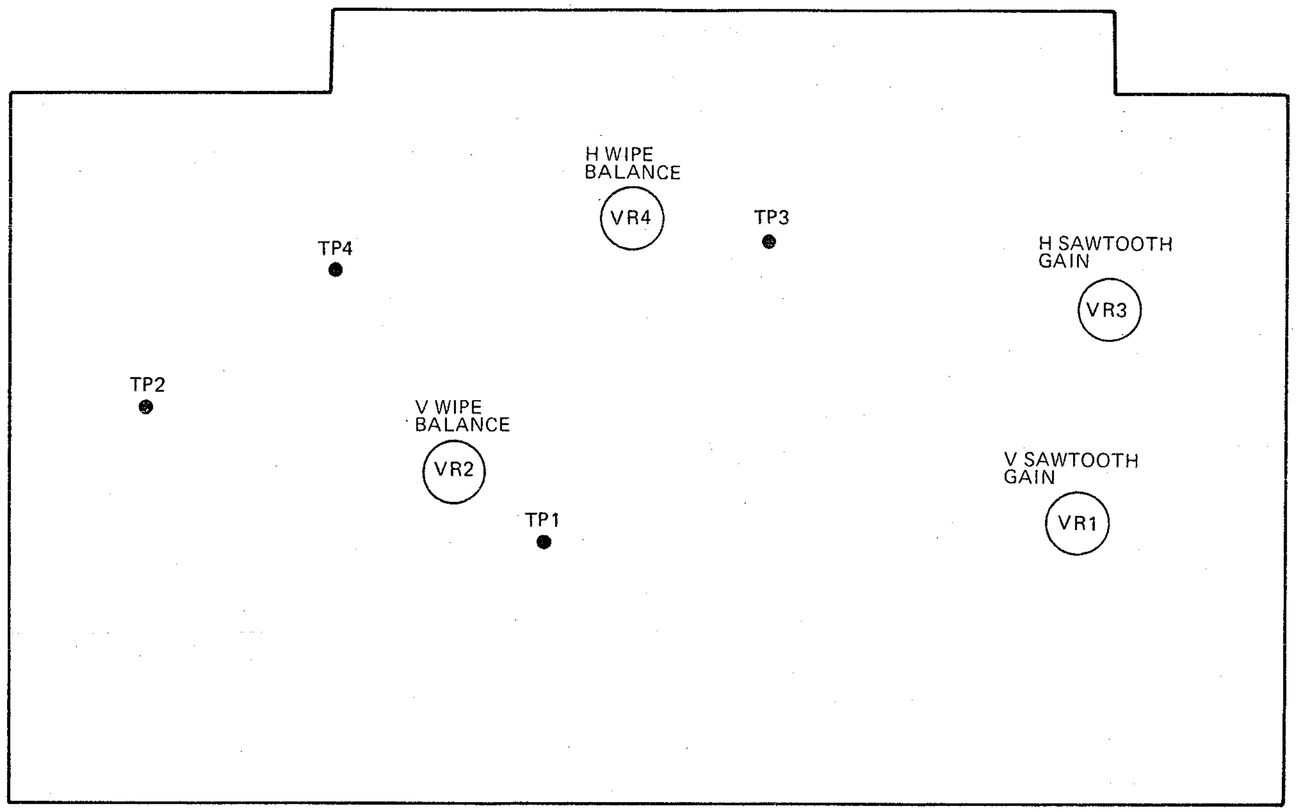

VR12
MIX A FAD FINE 1
VR14
MIX B FAD FINE 1
TP11
TP12
VR13
MIX A FAD FINE 2
VR15
MIX B FAD FINE 2
TP4
MIX/WIPE DC BALANCE
VR18
TP10
MIX VIDEO GAIN
VR7
MIX PHASE
TP8
VR9
VR8
DG/DP ADJ
TP9
TP7
TP6
TP5
EFF/PREVIEW DC BALANCE
VR17
TP3
DC BALANCE
WIPE PHASE
EFF VIDEO GAIN
VR11
MIX A GAIN
VR2
TP2
VR4
TP1
VR1
+5V SET
WIPE EDGE COMP.
VR3
VR5
VR10
WIPE A PEDESTAL
WIPE A GAIN
VR16
DG/DP ADJ
VR6

PREVIEW/EFFECT OUTPUT BOARD

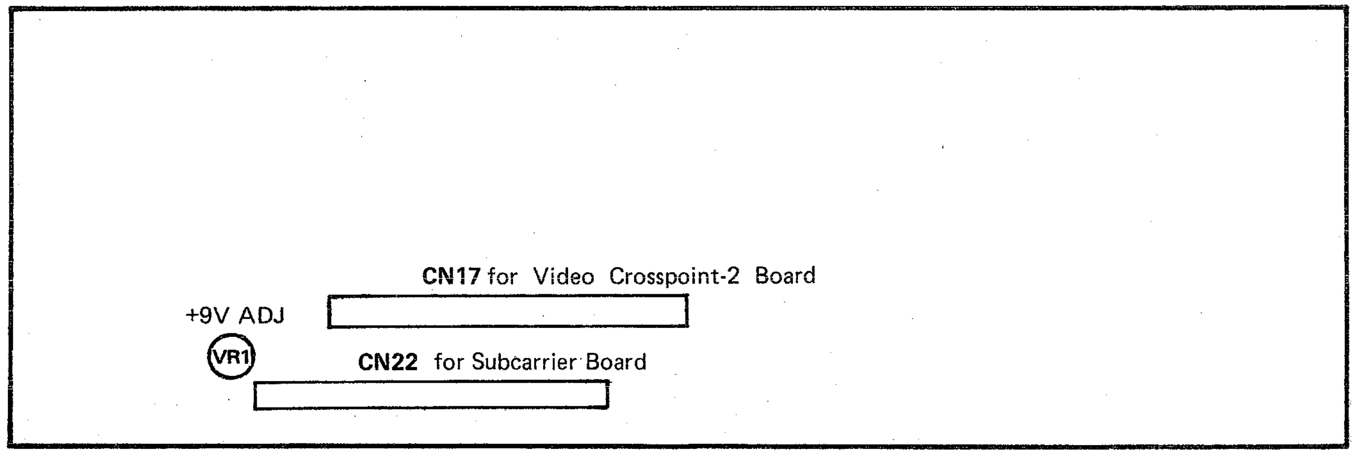

FREQ. RESPONSE COMP.
C20
DG/DP ADJ
VR7
TP6
VR6
EFF VIDEO GAIN
FREQ. RESPONSE COMP.
C11
PREVIEW VIDEO GAIN
VR2
DG/DP ADJ
VR3
TP3
VR5
SYNC SEPA LEVEL
TP5
PREVIEW PHASE
TP2
TP1
VR1
C5
FREQ. RESPONSE COMP.

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

WAVEFORM GENERATOR BOARD



MOTHER BOARD



d) Adjustment of the Difference of Phase Between PREVIEW and PROGRAM

Observe:	Vectorscope
Adjust:	VR1 (PREVIEW PHASE)

- Connect the vectorscope to PREVIEW output connector.
- Select the color bar signal on the video signal generator.
- Select MIX mode on the function selector.
- Set the CUT switch to the OFF position.
- Set the GEN LOCK switch to the ON position.
- Select the No. 4 (G/L) position on A and B inputs.
- Select the No. 4 (G/L) position on the preview/program selector.
- Set the MIX/WIPE lever to the upper position.
- Set the SC phase control on SUBCARRIER BOARD so that the color phase is proper on the vectorscope.
- Set the CUT switch to the ON position.
- Adjust VR1 so that the color bar vectors are properly positioned on the vectorscope.

e) Adjustment of the Difference of Frequency Response Between PREVIEW and PROGRAM

Observe:	Waveform Monitor
Adjust:	C5 (FREQ. RESPONSE COMP.)

- Connect the waveform monitor and vectorscope to PROGRAM output connector.
- Select the 10MHz sweep signal range on the video signal generator.
- Set the GEN LOCK switch to the ON position.
- Set the CUT switch to the ON position.
- Select the No. 4 (G/L) position on the preview/program selector.
- Adjust C5 so that frequency response is within +1dB, -3dB at 10MHz.

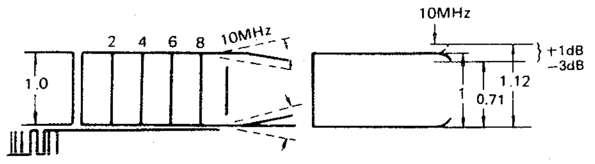


Fig. 3-2-25

(9) WAVEFORM GENERATOR BOARD

- Refer to page 16 for test points and adjusting controls
- Connect the underscanned color monitor (or B/W monitor), terminated by 75Ω, to PROGRAM 2 output connector.
- Set CUT switch to the OFF position.
- Select WIPE mode on the function selector.
- Select the convergence signal (cross hatch pattern) at the video signal generator.
- Set the GEN LOCK switch ON.
- Select 4(G/L) at input A and 5(No video signal) at input B.

a) Horizontal Wipe Coarse Adjustment

Observe:	Underscaned color (or B/W) monitor
Adjusts:	VR3 (H SAWTOOTH GAIN) VR4 (H WIPE BALANCE)

- Select the wipe mode ◨
- Adjust VR3 and VR4 so that input B signal (black signal) will just disappear when MIX/WIPE lever moves to the top, and input A signal will just disappear when lever moves to the bottom.

b) Vertical Wipe Coarse Adjustment

Observe:	Underscaned color (or B/W) monitor
Adjusts:	VR1 (V SAWTOOTH GAIN) VR2 (V WIPE BALANCE)

- Select the wipe mode ⬓.
- Adjust VR1 and VR2 so that input B signal will just disappear when MIX/WIPE lever moves to the top, and input A signal will just disappear when lever moves to the bottom.

c) Wipe Fine Adjustment

Observe:	Underscaned color (or B/W) monitor
Adjusts:	VR1 (V SAWTOOTH GAIN) VR2 (V WIPE BALANCE) VR3 (H SAWTOOTH GAIN) VR4 (H WIPE BALANCE)

- Adjust the waveform generator so that the following convergence signal appears on the output.

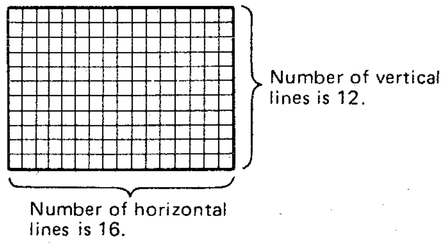

Number of vertical lines is 12.
Number of horizontal lines is 16.

Fig. 3-2-26

- Readjust VR1, VR2, VR3 and VR4 so that the B signal reaches each corner of the screen when MIX/WIPE lever moves to top or bottom when selecting the following wipe mode patterns ▘ ▖, ▝, ▗.

Service Manual

Vol. 3

Special Effects Generator
WJ-4600

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Schematic Diagrams
Conductor Views

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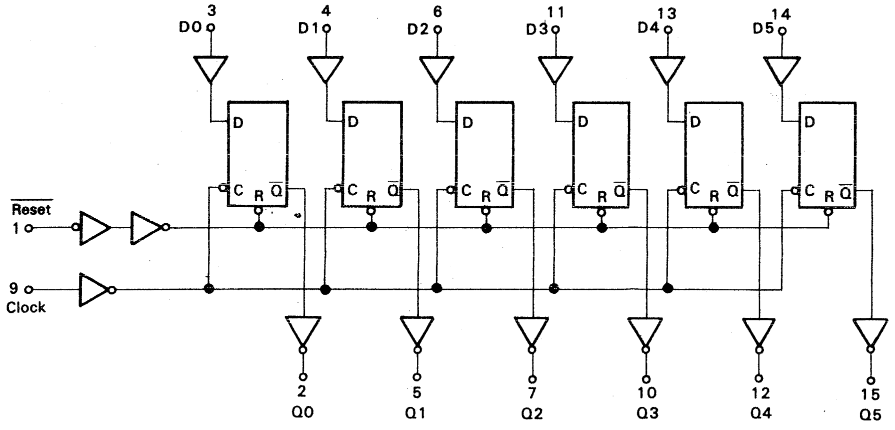
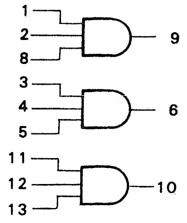
BLOCK DIAGRAM OF ICs

YWMC14174BCP
(Hex D Type Flip Flops)



3
D0
4
D1
6
D2
11
D3
13
D4
14
D5
D
C R Q̄
Reset
1
9
Clock
2
Q0
5
Q1
7
Q2
10
Q3
12
Q4
15
Q5

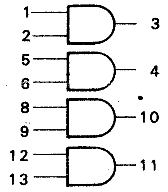
YWMC14073BCP
(Triple 3-input AND Gates)



1
2
8
9
3
4
5
6
11
12
13
10

V_{DD}=Pin 14
V_{SS}=Pin 7

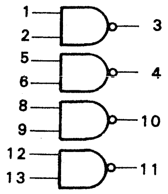
YWMC14081BCP
(Quad 2-input AND Gates)



1
2
3
5
6
4
8
9
10
12
13
11

V_{DD}=Pin 14
V_{SS}=Pin 7

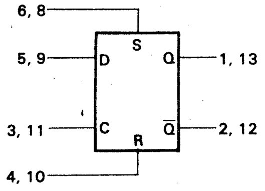
MN4011B
(Quad 2-input NAND Gates)



1
2
3
5
6
4
8
9
10
12
13
11

V_{DD}=Pin 14
V_{SS}=Pin 7

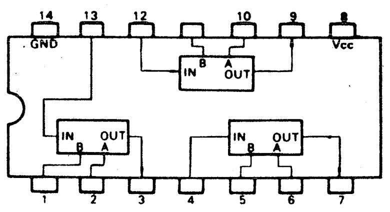
YWMC14013BCP
(Dual D Type Flip Flops)



6, 8
5, 9
D
S
Q
1, 13
3, 11
C
R
Q̄
2, 12
4, 10

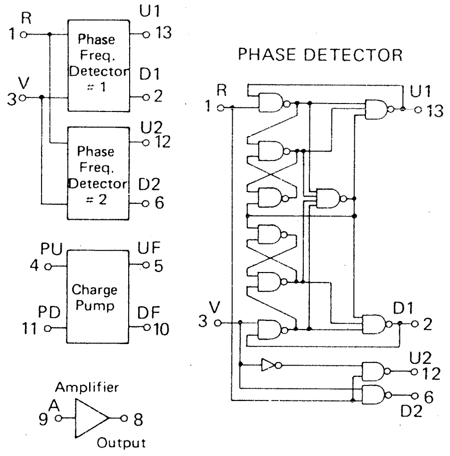
V_{DD}=Pin 14
V_{SS}=Pin 7

DN850
(Triple Monostable Multivibrators)



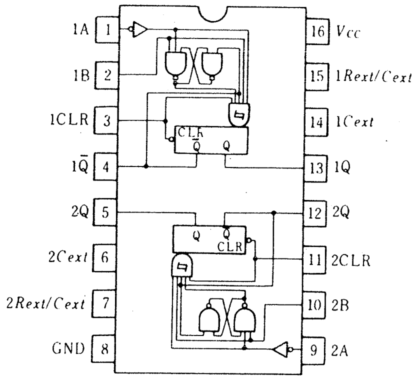
14
13
12
10
9
8
GND
Vcc
IN
B
A
OUT
1
2
3
4
5
6
7

YWMC4044P
(Phase/Frequency Detector)



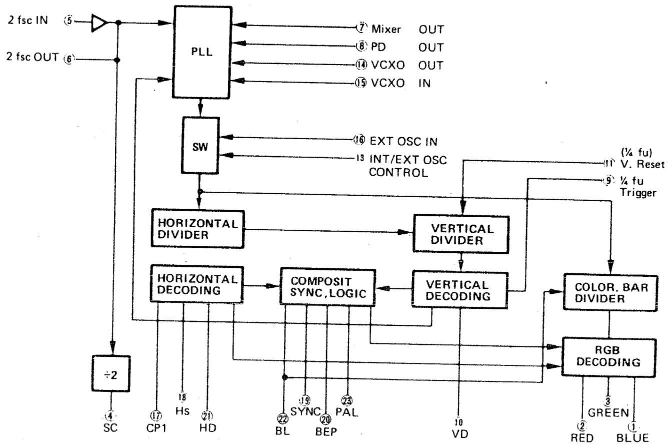
R
1
U1
13
Phase Freq. Detector ≠ 1
V
3
D1
2
U2
12
Phase Freq. Detector ≠ 2
D2
6
PU
4
UF
5
Charge Pump
PD
11
DF
10
Amplifier
A
9
8
Output
PHASE DETECTOR

YWHD74221P
YWHD74LS221P
(Dual Monostable Multivibrators with Schmitt Trigger Input)



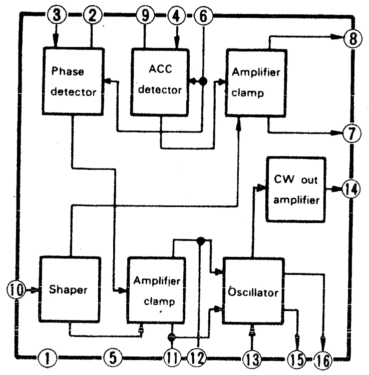
1A
1
1B
2
1CLR
3
1Q̄
4
2Q
5
2Cext
6
2Rext/Cext
7
GND
8
16
Vcc
15
1Rext/Cext
14
1Cext
13
1Q
12
2Q
11
2CLR
10
2B
9
2A
CLR
Q̄
Q

MN6065
(PAL Sync Generator)



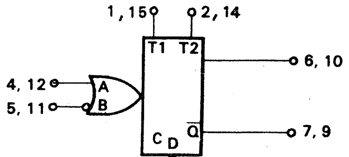
2 fsc IN ⑤
2 fsc OUT ⑥
PLL
⑦ Mixer OUT
⑧ PD OUT
⑭ VCXO OUT
⑮ VCXO IN
SW
⑯ EXT OSC IN
13 INT/EXT OSC CONTROL
(¼ fu)
⑪ V. Reset
⑨ ¼ fu Trigger
HORIZONTAL DIVIDER
VERTICAL DIVIDER
HORIZONTAL DECODING
COMPOSIT SYNC, LOGIC
VERTICAL DECODING
COLOR. BAR DIVIDER
RGB DECODING
÷2
④ SC
⑰ CP1
18 Hs
㉑ HD
㉒ BL
⑲ SYNC
⑳ BEP
㉓ PAL
10 VD
② RED
3 GREEN
① BLUE

AN236
(Subcarrier Processing Circuit)



③
②
⑨
④
⑥
Phase detector
ACC detector
Amplifier clamp
⑧
⑦
CW out amplifier
⑭
⑩
Shaper
Amplifier clamp
Oscillator
①
⑤
⑪
⑫
⑬
⑮
⑯

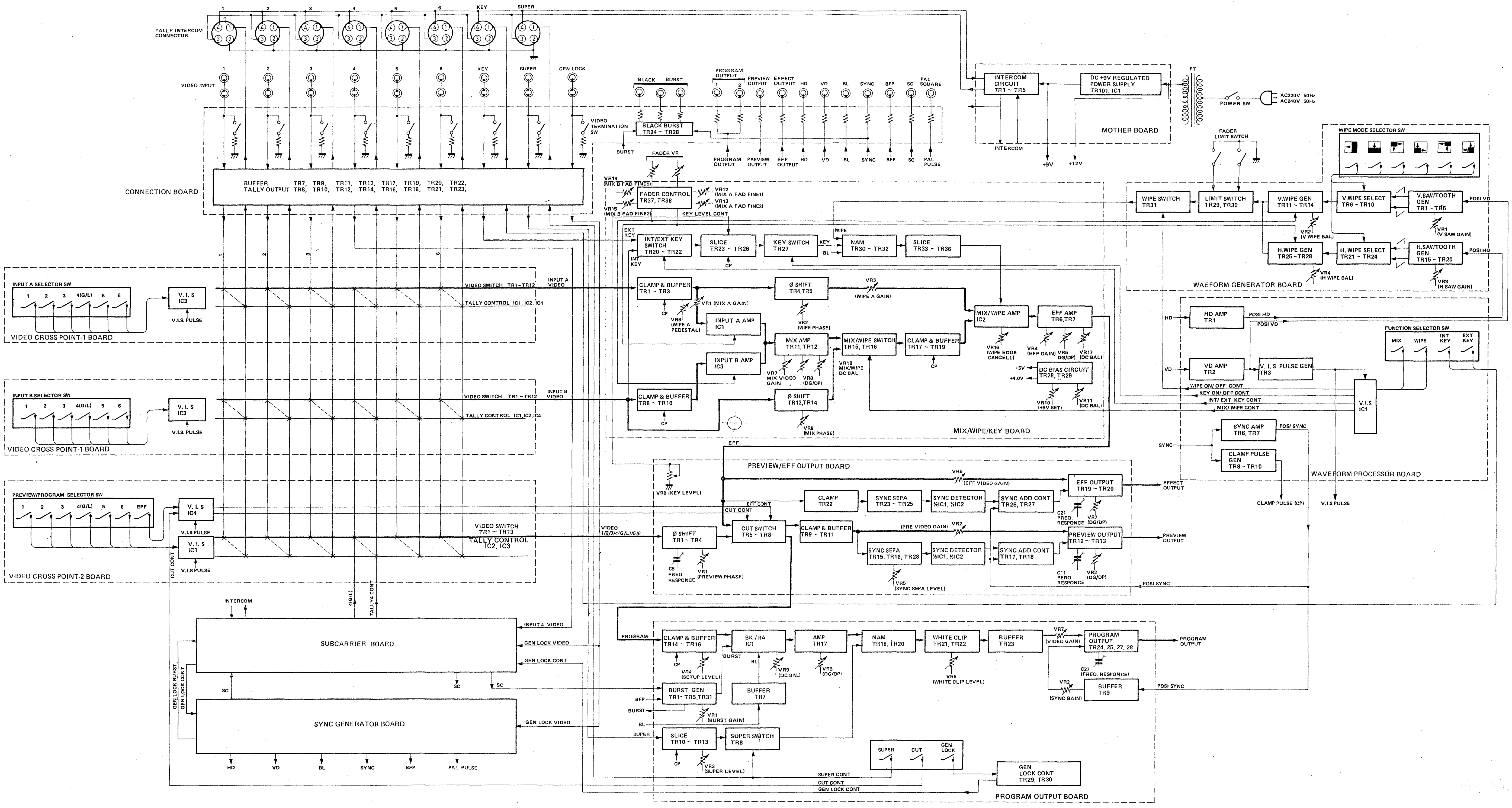
YWMC14528BCP
(Dual Monostable Multivibrators)



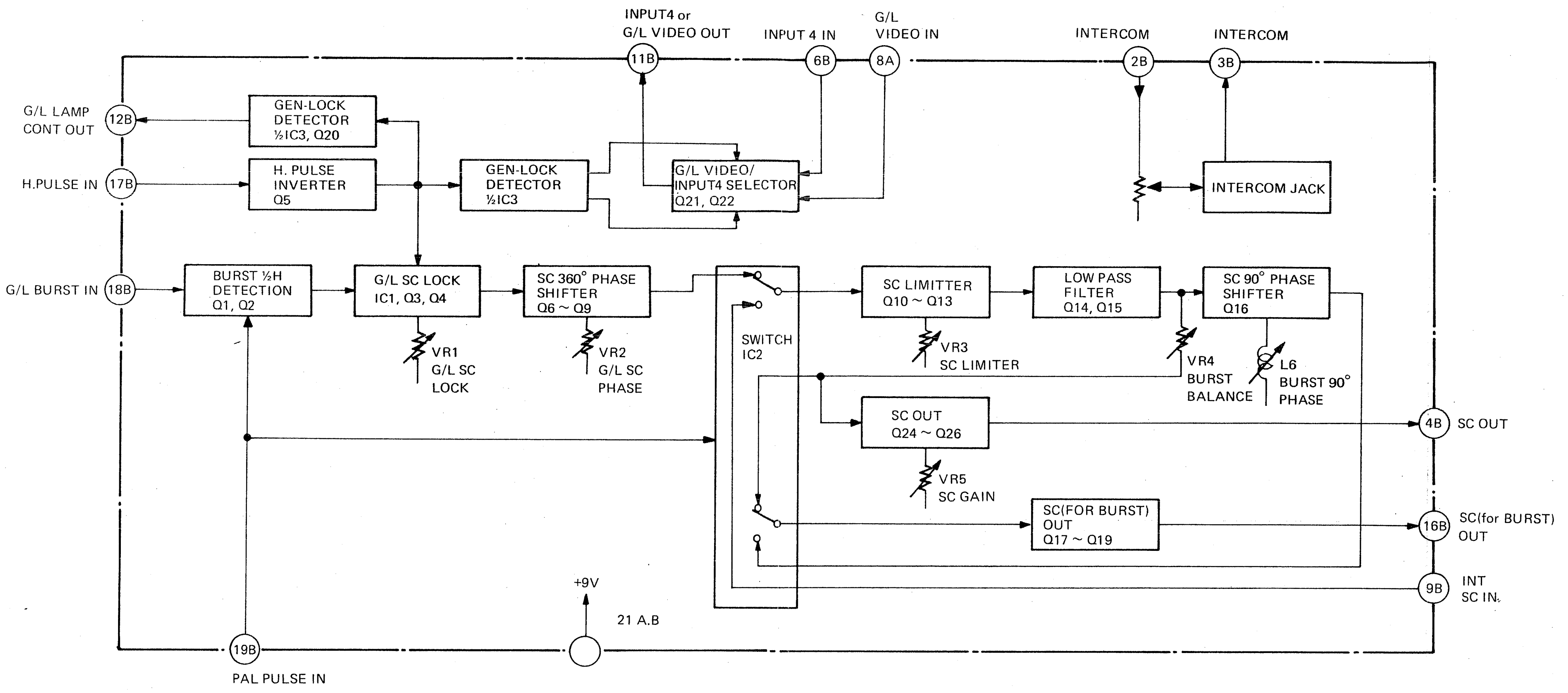
1, 15
2, 14
T1
T2
6, 10
4, 12
5, 11
A
B
C D
Q̄
7, 9
3, 13

V_{DD}=Pin 16
V_{SS}=Pin 8

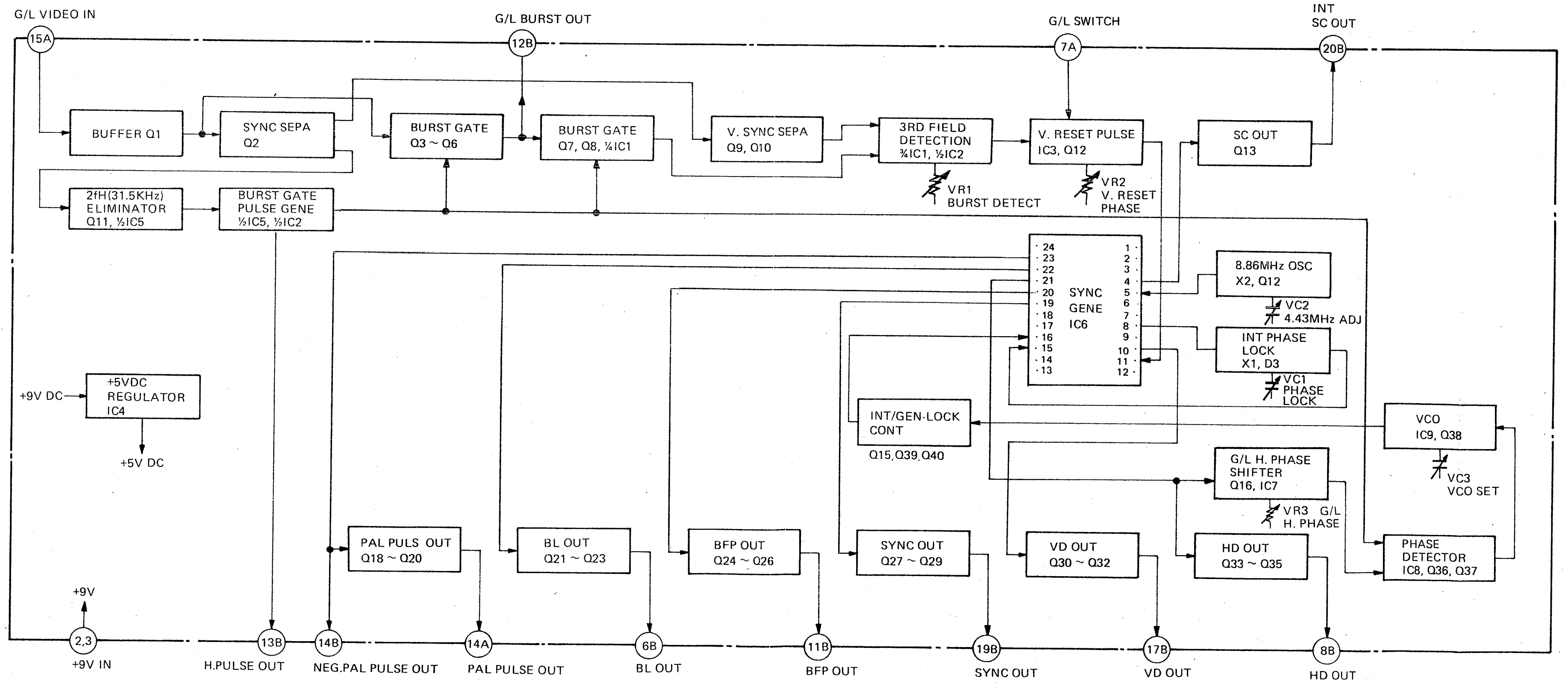
BLOCK DIAGRAM OF WJ-4600


TALLY INTERCOM CONNECTOR
VIDEO INPUT
1
2
3
4
5
6
KEY
SUPER
GEN LOCK
VIDEO TERMINATION SW
CONNECTION BOARD
BUFFER TALLY OUTPUT TR7, TR8, TR9, TR10, TR11, TR12, TR13, TR14, TR17, TR16, TR19, TR18, TR20, TR21, TR22, TR23,
BLACK
BURST
BLACK BURST TR24 ~ TR28
PROGRAM OUTPUT
PREVIEW OUTPUT
EFFECT OUTPUT
HD
VD
BL
SYNC
BFP
SC
PAL SQUARE
PAL PULSE
INTERCOM CIRCUIT TR1 ~ TR5
DC +9V REGULATED POWER SUPPLY TR101, IC1
MOTHER BOARD
INTERCOM
+9V
+12V
PT
POWER SW
AC220V 50Hz
AC240V 50Hz
FADER VR
VR14 (MIX B FAD FINE1)
VR15 (MIX B FAD FINE2)
FADER CONTROL TR37, TR38
VR12 (MIX A FAD FINE1)
VR13 (MIX A FAD FINE2)
KEY LEVEL CONT
EXT KEY
INT KEY
INT/EXT KEY SWITCH TR20 ~ TR22
SLICE TR23 ~ TR26
KEY SWITCH TR27
WIPE
NAM TR30 ~ TR32
SLICE TR33 ~ TR36
INPUT A VIDEO
INPUT B VIDEO
CLAMP & BUFFER TR1 ~ TR3
VR1 (MIX A GAIN)
VR6 (WIPE A PEDESTAL)
INPUT A AMP IC1
INPUT B AMP IC3
Ø SHIFT TR4, TR5
VR3 (WIPE A GAIN)
VR2 (WIPE PHASE)
MIX AMP TR11, TR12
VR7 MIX VIDEO GAIN
VR8 (DG/DP)
MIX/WIPE SWITCH TR15, TR16
VR18 MIX/WIPE DC BAL
CLAMP & BUFFER TR17 ~ TR19
MIX/WIPE AMP IC2
EFF AMP TR6, TR7
VR16 (WIPE EDGE CANCELL)
VR4 (EFF GAIN)
VR5 DG/DP
VR17 (DC BAL)
DC BIAS CIRCUIT TR28, TR29
VR10 (+5V SET)
VR11 (DC BAL)
CLAMP & BUFFER TR8 ~ TR10
Ø SHIFT TR13, TR14
VR9 (MIX PHASE)
CP
MIX/WIPE/KEY BOARD
INPUT A SELECTOR SW
VIDEO SWITCH TR1 ~ TR12
TALLY CONTROL IC1, IC2, IC4
V.I.S IC3
V.I.S. PULSE
VIDEO CROSS POINT-1 BOARD
INPUT B SELECTOR SW
PREVIEW/PROGRAM SELECTOR SW
EFF
V.I.S IC4
V.I.S IC1
VIDEO SWITCH TR1 ~ TR13
TALLY CONTROL IC2, IC3
CUT CONT
VIDEO CROSS POINT-2 BOARD
WIPE MODE SELECTOR SW
FADER LIMIT SWITCH
WIPE SWITCH TR31
LIMIT SWITCH TR29, TR30
V.WIPE GEN TR11 ~ TR14
V.WIPE SELECT TR6 ~ TR10
V.SAWTOOTH GEN TR1 ~ TR6
POSI VD
VR2 (V WIPE BAL)
VR1 (V SAW GAIN)
H.WIPE GEN TR25 ~ TR28
H. WIPE SELECT TR21 ~ TR24
H.SAWTOOTH GEN TR15 ~ TR20
POSI HD
VR4 (H WIPE BAL)
VR3 (H SAW GAIN)
WAEFORM GENERATOR BOARD
HD AMP TR1
VD AMP TR2
V. I. S PULSE GEN TR3
FUNCTION SELECTOR SW
MIX
WIPE
INT KEY
EXT KEY
WIPE ON/OFF CONT
KEY ON/OFF CONT
INT/EXT KEY CONT
MIX/WIPE CONT
V.I.S IC1
SYNC AMP TR6, TR7
POSI SYNC
CLAMP PULSE GEN TR8 ~ TR10
WAVEFORM PROCESSOR BOARD
CLAMP PULSE (CP)
V.I.S PULSE
PREVIEW/EFF OUTPUT BOARD
VR9 (KEY LEVEL)
VR6 (EFF VIDEO GAIN)
EFF CONT
CLAMP TR22
SYNC SEPA TR23 ~ TR25
SYNC DETECTOR ½IC1, ½IC2
SYNC ADD CONT TR26, TR27
EFF OUTPUT TR19 ~ TR20
EFFECT OUTPUT
C21 FREQ. RESPONCE
VR7 (DG/DP)
VIDEO 1/2/3/4(G/L)/5/6
Ø SHIFT TR1 ~ TR4
CUT SWITCH TR5 ~ TR8
CLAMP & BUFFER TR9 ~ TR11
VR2 (PRE VIDEO GAIN)
SYNC SEPA TR15, TR16, TR28
SYNC DETECTOR ½IC1, ½IC2
SYNC ADD CONT TR17, TR18
PREVIEW OUTPUT TR12 ~ TR13
PREVIEW OUTPUT
C5 FREQ RESPONCE
VR1 (PREVIEW PHASE)
VR5 (SYNC SEPA LEVEL)
C11 FERQ. RESPONCE
VR3 (DG/DP)
INTERCOM
4(G/L)
TALLY 4 CONT
SUBCARRIER BOARD
INPUT 4 VIDEO
GEN LOCK VIDEO
GEN LOCK CONT
GEN LOCK BURST
GEN LOCK CONT
SYNC GENERATOR BOARD
PAL PULSE
PROGRAM
CLAMP & BUFFER TR14 ~ TR16
VR4 (SETUP LEVEL)
BK/BA IC1
VR9 (DC BAL)
AMP TR17
VR5 (DG/DP)
NAM TR18, TR20
WHITE CLIP TR21, TR22
VR6 (WHITE CLIP LEVEL)
BUFFER TR23
VR7 (VIDEO GAIN)
PROGRAM OUTPUT TR24, 25, 27, 28
C27 (FREQ. RESPONCE)
VR2 (SYNC GAIN)
BUFFER TR9
BURST GEN TR1~TR5, TR31
VR1 (BURST GAIN)
BUFFER TR7
SLICE TR10 ~ TR13
VR3 (SUPER LEVEL)
SUPER SWITCH TR8
SUPER
CUT
GEN LOCK
GEN LOCK CONT TR29, TR30
SUPER CONT
CUT CONT
GEN LOCK CONT
PROGRAM OUTPUT BOARD

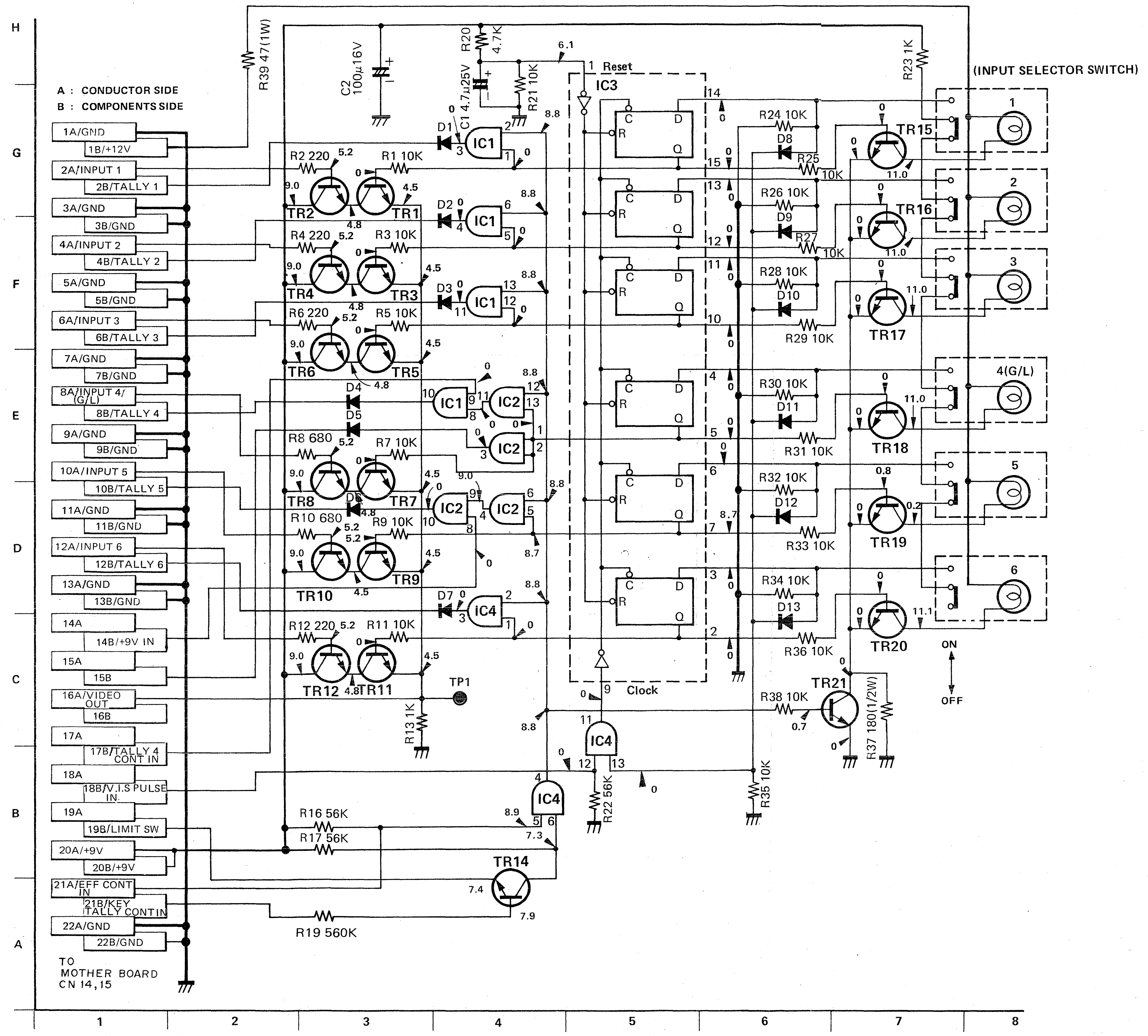
BLOCK DIAGRAM OF SUBCARRIER BOARD


INPUT4 or G/L VIDEO OUT
11B
INPUT 4 IN
6B
G/L VIDEO IN
8A
INTERCOM
2B
INTERCOM
3B
G/L LAMP CONT OUT
12B
GEN-LOCK DETECTOR ½IC3, Q20
H.PULSE IN
17B
H. PULSE INVERTER Q5
GEN-LOCK DETECTOR ½IC3
G/L VIDEO/ INPUT4 SELECTOR Q21, Q22
INTERCOM JACK
G/L BURST IN
18B
BURST ½H DETECTION Q1, Q2
G/L SC LOCK IC1, Q3, Q4
SC 360° PHASE SHIFTER Q6 ~ Q9
SWITCH IC2
SC LIMITTER Q10 ~ Q13
LOW PASS FILTER Q14, Q15
SC 90° PHASE SHIFTER Q16
VR1 G/L SC LOCK
VR2 G/L SC PHASE
VR3 SC LIMITER
VR4 BURST BALANCE
L6 BURST 90° PHASE
SC OUT Q24 ~ Q26
4B
SC OUT
VR5 SC GAIN
SC(FOR BURST) OUT Q17 ~ Q19
16B
SC(for BURST) OUT
9B
INT SC IN.
+9V
21 A.B
19B
PAL PULSE IN

BLOCK DIAGRAM OF SYNC GENERATOR BOARD


G/L VIDEO IN
15A
G/L BURST OUT
12B
G/L SWITCH
7A
INT SC OUT
20B
BUFFER Q1
SYNC SEPA Q2
BURST GATE Q3 ~ Q6
BURST GATE Q7, Q8, ¼IC1
V. SYNC SEPA Q9, Q10
3RD FIELD DETECTION ¾IC1, ½IC2
V. RESET PULSE IC3, Q12
SC OUT Q13
VR1 BURST DETECT
VR2 V. RESET PHASE
2fH(31.5KHz) ELIMINATOR Q11, ½IC5
BURST GATE PULSE GENE ½IC5, ½IC2
SYNC GENE IC6
24 23 22 21 20 19 18 17 16 15 14 13
1 2 3 4 5 6 7 8 9 10 11 12
8.86MHz OSC X2, Q12
VC2 4.43MHz ADJ
INT PHASE LOCK X1, D3
VC1 PHASE LOCK
+9V DC
+5VDC REGULATOR IC4
+5V DC
INT/GEN-LOCK CONT
Q15,Q39,Q40
VCO IC9, Q38
VC3 VCO SET
G/L H. PHASE SHIFTER Q16, IC7
VR3 G/L H. PHASE
PAL PULS OUT Q18 ~ Q20
BL OUT Q21 ~ Q23
BFP OUT Q24 ~ Q26
SYNC OUT Q27 ~ Q29
VD OUT Q30 ~ Q32
HD OUT Q33 ~ Q35
PHASE DETECTOR IC8, Q36, Q37
+9V
2,3
+9V IN
13B
H.PULSE OUT
14B
NEG.PAL PULSE OUT
14A
PAL PULSE OUT
6B
BL OUT
11B
BFP OUT
19B
SYNC OUT
17B
VD OUT
8B
HD OUT

SCHEMATIC DIAGRAM OF VIDEO CROSSPOINT-1 BOARD

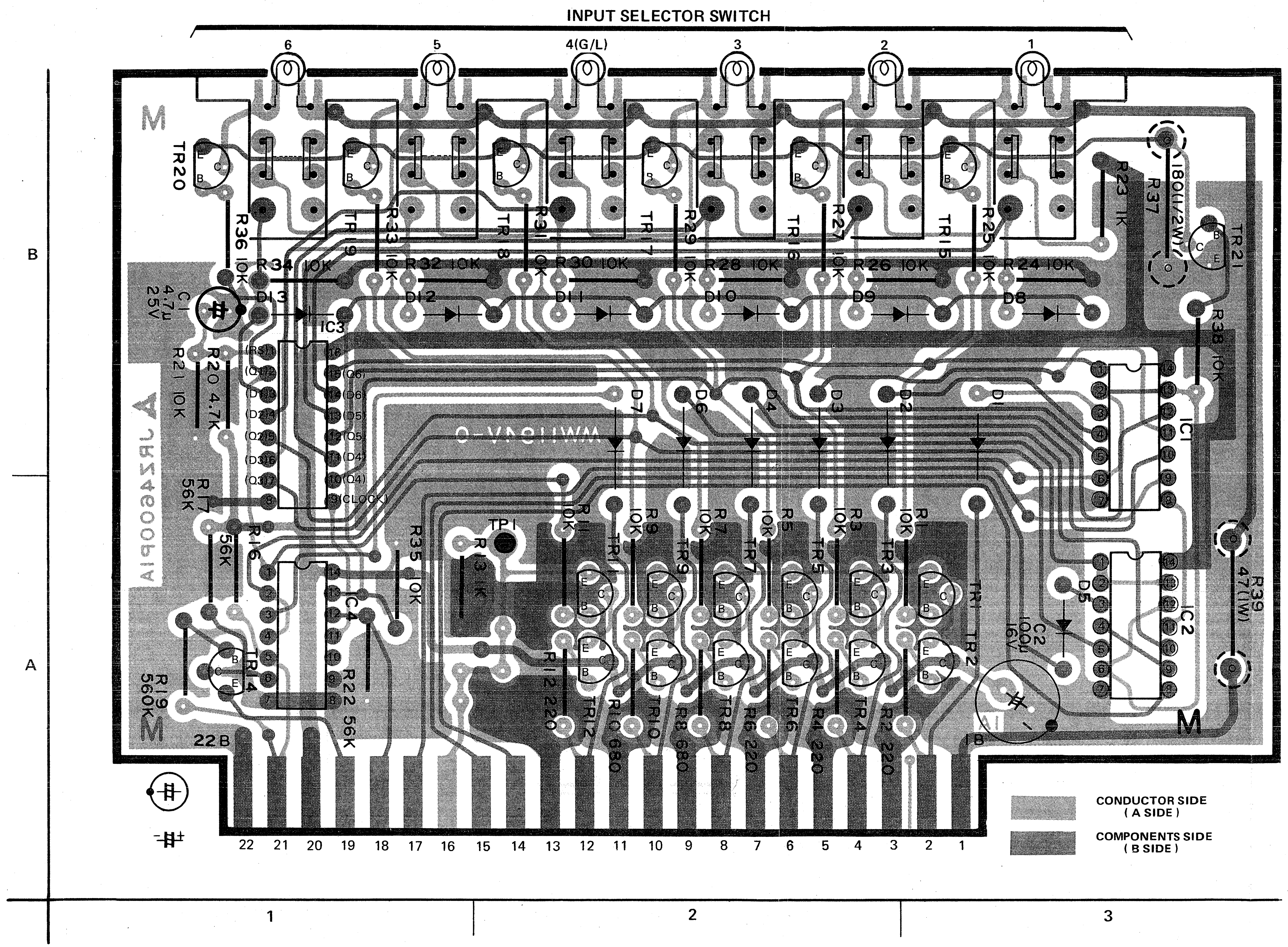

A : CONDUCTOR SIDE
B : COMPONENTS SIDE
1A/GND
1B/+12V
2A/INPUT 1
2B/TALLY 1
3A/GND
3B/GND
4A/INPUT 2
4B/TALLY 2
5A/GND
5B/GND
6A/INPUT 3
6B/TALLY 3
7A/GND
7B/GND
8A/INPUT 4/(G/L)
8B/TALLY 4
9A/GND
9B/GND
10A/INPUT 5
10B/TALLY 5
11A/GND
11B/GND
12A/INPUT 6
12B/TALLY 6
13A/GND
13B/GND
14A
14B/+9V IN
15A
15B
16A/VIDEO OUT
16B
17A
17B/TALLY 4 CONT IN
18A
18B/V.I.S PULSE IN
19A
19B/LIMIT SW
20A/+9V
20B/+9V
21A/EFF CONT IN
21B/KEY TALLY CONT IN
22A/GND
22B/GND
TO MOTHER BOARD CN 14,15
R39 47(1W)
C2 100μ16V
R20 4.7K
C1 4.7μ25V
R21 10K
Reset
IC3
Clock
R23 1K
(INPUT SELECTOR SWITCH)
R24 10K
R25 10K
R26 10K
R27 10K
R28 10K
R29 10K
R30 10K
R31 10K
R32 10K
R33 10K
R34 10K
R36 10K
R38 10K
R37 180(1/2W)
R35 10K
R22 56K
R13 1K
TP1
R2 220
R1 10K
R4 220
R3 10K
R6 220
R5 10K
R8 680
R7 10K
R10 680
R9 10K
R12 220
R11 10K
R16 56K
R17 56K
R19 560K
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
TR11
TR12
TR14
TR15
TR16
TR17
TR18
TR19
TR20
TR21
IC1
IC2
IC4
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
1
2
3
4(G/L)
5
6
ON
OFF
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8

VIDEO CROSSPOINT-1 BOARD

IC1	YWMC14081BCP	E-G4
IC2	YWMC14081BCP	D, E4
IC3	YWMC14174BCP	C-G5
IC4	YWMC14081BCP	B, C4,5
TR1	2SC828AR	G3
TR2	2SC828AR	G3
TR3	2SC828AR	F3
TR4	2SC828AR	F3
TR5	2SC828AR	E3
TR6	2SC828AR	E3
TR7	2SC828AR	D3
TR8	2SC828AR	D3
TR9	2SC828AR	D3
TR10	2SC828AR	D3
TR11	2SC828AR	C3
TR12	2SC828AR	C3
TR14	2SC828AR	A4
TR15	2SC1318-RS	G7
TR16	2SC1318-RS	F7
TR17	2SC1318-RS	F7
TR18	2SC1318-RS	E7
TR19	2SC1318-RS	D7
TR20	2SC1318-RS	C7
TR21	2SC1318-RS	C7
D1	MA162	G4
D2	MA162	F4
D3	MA162	F4
D4	MA162	E3
D5	MA162	E3
D6	MA162	D3
D7	MA162	D4
D8	MA162	G6
D9	MA162	F6
D10	MA162	F6
D11	MA162	E6
D12	MA162	D6
D13	MA162	C6

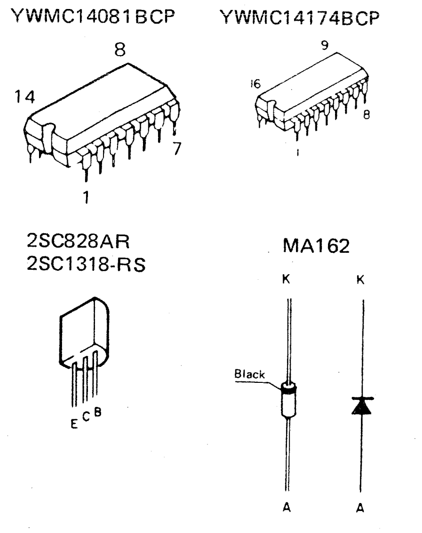
CONDUCTOR VIEW OF VIDEO CROSSPOINT-1 BOARD

— Components Side —

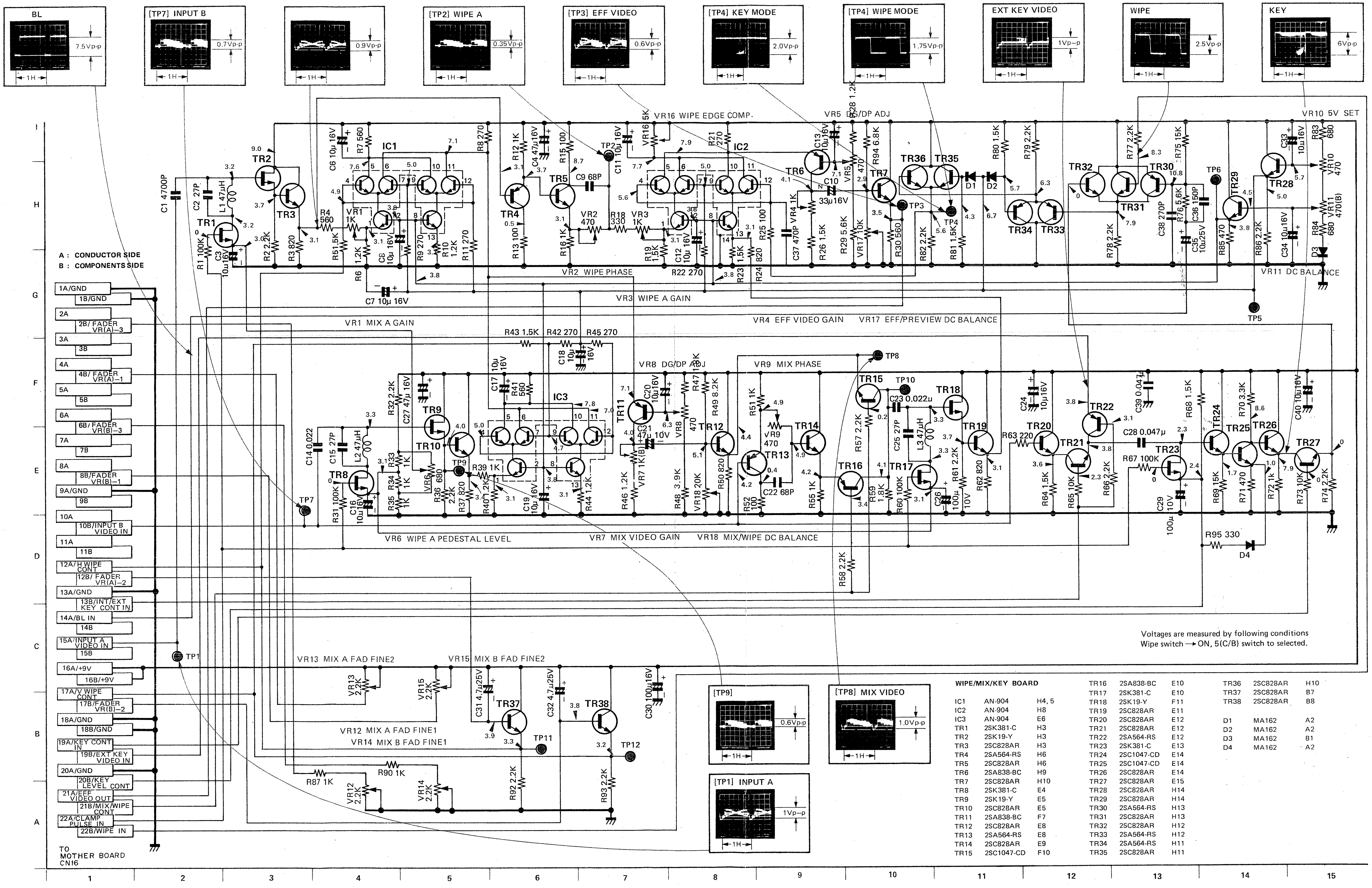

INPUT SELECTOR SWITCH
6
5
4(G/L)
3
2
1
B
A
1
2
3
TR20
TR19
TR18
TR17
TR16
TR15
TR21
R36 10K
R34 10K
R33 10K
R32 10K
R31 10K
R30 10K
R29 10K
R28 10K
R27 10K
R26 10K
R25 10K
R24 10K
R23 1K
R37 180Ω(1/2W)
R38 10K
D13
D12
D11
D10
D9
D8
D7
D6
D4
D3
D2
D1
D5
C1 4.7μ 25V
IC3
IC1
IC2
R20 4.7K
R21 10K
R17 56K
R16 56K
R19 560K
TR14
C4
R22 56K
R35 10K
TP1
R13 1K
R11 10K
R9 10K
R7 10K
R5 10K
R3 10K
R1 10K
TR11
TR9
TR7
TR5
TR3
TR1
TR2
TR4
TR6
TR8
TR10
TR12
R12 220
R10 680
R8 680
R6 220
R4 220
R2 220
C2 100μ 16V
R39 47(1W)
22B
1B
M
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
▨ CONDUCTOR SIDE (A SIDE)
▨ COMPONENTS SIDE (B SIDE)

VIDEO CROSSPOINT-1 BOARD

IC1	YWMC14081BCP	B3
IC2	YWMC14081BCP	A3
IC3	YWMC14174BCP	B1
IC4	YWMC14081BCP	A1
TR1	2SC828AR	A3
TR2	2SC828AR	A3
TR3	2SC828AR	A2
TR4	2SC828AR	A2
TR5	2SC828AR	A2
TR6	2SC828AR	A2
TR7	2SC828AR	A2
TR8	2SC828AR	A2
TR9	2SC828AR	A2
TR10	2SC828AR	A2
TR11	2SC828AR	A2
TR12	2SC828AR	A2
TR14	2SC828AR	A1
TR15	2SC1318-RS	B3
TR16	2SC1318-RS	B2
TR17	2SC1318-RS	B2
TR18	2SC1318-RS	B2
TR19	2SC1318-RS	B1
TR20	2SC1318-RS	B1
TR21	2SC1318-RS	B3
D1	MA162	B3
D2	MA162	B2
D3	MA162	B2
D4	MA162	B2
D5	MA162	A3
D6	MA162	B2
D7	MA162	B2
D8	MA162	B3
D9	MA162	B2, B3
D10	MA162	B2
D11	MA162	B2
D12	MA162	B1
D13	MA162	B1


YWMC14081BCP
8
14
7
1
YWMC14174BCP
9
16
8
1
2SC828AR
2SC1318-RS
E C B
MA162
K
K
Black
A
A

SCHEMATIC DIAGRAM OF WIPE/MIX/KEY BOARD


BL
7.5Vp-p
1H
[TP7] INPUT B
0.7Vp-p
0.9Vp-p
[TP2] WIPE A
0.35Vp-p
[TP3] EFF VIDEO
0.6Vp-p
[TP4] KEY MODE
2.0Vp-p
[TP4] WIPE MODE
1.75Vp-p
EXT KEY VIDEO
1Vp-p
WIPE
2.5Vp-p
KEY
6Vp-p
A : CONDUCTOR SIDE
B : COMPONENTS SIDE
1A/GND
1B/GND
2A
2B/ FADER VR(A)-3
3A
3B
4A
4B/ FADER VR(A)-1
5A
5B
6A
6B/ FADER VR(B)-3
7A
7B
8A
8B/FADER VR(B)-1
9A/GND
9B
10A
10B/INPUT B VIDEO IN
11A
11B
12A/H WIPE CONT
12B/ FADER VR(A)-2
13A/GND
13B/INT/EXT KEY CONT IN
14A/BL IN
14B
15A/INPUT A VIDEO IN
15B
16A/+9V
16B/+9V
17A/V WIPE CONT
17B/FADER VR(B)-2
18A/GND
18B/GND
19A/KEY CONT IN
19B/EXT KEY VIDEO IN
20A/GND
20B/KEY LEVEL CONT
21A/EFF VIDEO OUT
21B/MIX/WIPE CONT
22A/CLAMP PULSE IN
22B/WIPE IN
TO MOTHER BOARD CN16
IC1
IC2
IC3
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR14
TR15
TR16
TR17
TR18
TR19
TR20
TR21
TR22
TR23
TR24
TR25
TR26
TR27
TR28
TR29
TR30
TR31
TR32
TR33
TR34
TR35
TR36
TR37
TR38
D1
D2
D3
D4
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
C1 4700P
C2 27P
L1 47μH
R1 100K
C3 10μ16V
R2 2.2K
R3 820
R4 560
VR1 1K
R5 1.5K
R6 1.2K
C6 10μ 16V
C7 10μ 16V
R7 560
R8 270
R9 270
R10 1.2K
R11 270
R12 1K
C4 47μ16V
R13 100
R15 100
C9 68P
R16 1K
VR2 470
R18 330
VR3 1K
R19 1.5K
C11 10μ 16V
VR16 5K
VR16 WIPE EDGE COMP.
R21 270
C12 10μ 16V
R22 270
R23 1.5K
R24 820
R25 100
C37 470P
VR4 1K
C10 33μ16V
C13 10μ16V
R26 1.5K
VR5 S/DP ADJ
R28 1.2K
R94 6.8K
R29 5.6K
VR17 10K
R30 560
R82 2.2K
R81 1.5K
R80 1.5K
R79 2.2K
R77 2.2K
R78 2.2K
R75 15K
R76 5.6K
C38 270P
C35 10μ25V
C36 150P
R85 470
R86 2.2K
C34 10μ16V
C33 10μ16V
R83 680
R84 680
VR10 470
VR11 470(B)
VR10 5V SET
VR11 DC BALANCE
VR2 WIPE PHASE
VR3 WIPE A GAIN
VR1 MIX A GAIN
VR4 EFF VIDEO GAIN
VR17 EFF/PREVIEW DC BALANCE
R43 1.5K
R42 270
R45 270
C17 10μ 16V
R41 560
C18 10μ 16V
VR8 DG/DP ADJ
VR9 MIX PHASE
C14 0.022
C15 27P
L2 47μH
R32 2.2K
C27 47μ 16V
R33 1K
R34 1K
R35 1K
R31 100K
C16 10μ16V
VR6 680
R36 2.2K
R37 820
R39 1K
R40 1.2K
C19 10μ 16V
R44 1.2K
C20 10μ16V
C21 47μ 10V
VR7 1K(B)
R46 1.2K
R47 1K
R49 8.2K
VR8 470
R48 3.9K
VR18 20K
R50 820
R51 1K
VR9 470
R52 100
C22 68P
R55 1K
R57 2.2K
C23 0.022μ
C25 27P
L3 47μH
R59 1.8K
R60 100K
C26 100μ 10V
R61 2.2K
R62 820
C24 10μ16V
R63 220
R64 1.5K
R65 10K
R66 2.2K
C39 0.047μ
C28 0.047μ
R67 100K
C29 100μ 10V
R68 1.5K
R69 15K
R70 3.3K
R71 470
R72 1k
R73 10K
R74 2.2K
C40 10μ16V
R95 330
R58 2.2K
VR6 WIPE A PEDESTAL LEVEL
VR7 MIX VIDEO GAIN
VR18 MIX/WIPE DC BALANCE
VR13 MIX A FAD FINE2
VR15 MIX B FAD FINE2
VR13 2.2K
VR15 2.2K
C31 4.7μ25V
C32 4.7μ25V
C30 100μ16V
VR12 MIX A FAD FINE1
VR14 MIX B FAD FINE1
R87 1K
R90 1K
VR12 2.2K
VR14 2.2K
R92 2.2K
R93 2.2K
[TP9]
0.6Vp-p
[TP8] MIX VIDEO
1.0Vp-p
[TP1] INPUT A
1Vp-p
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
I
H
G
F
E
D
C
B
A

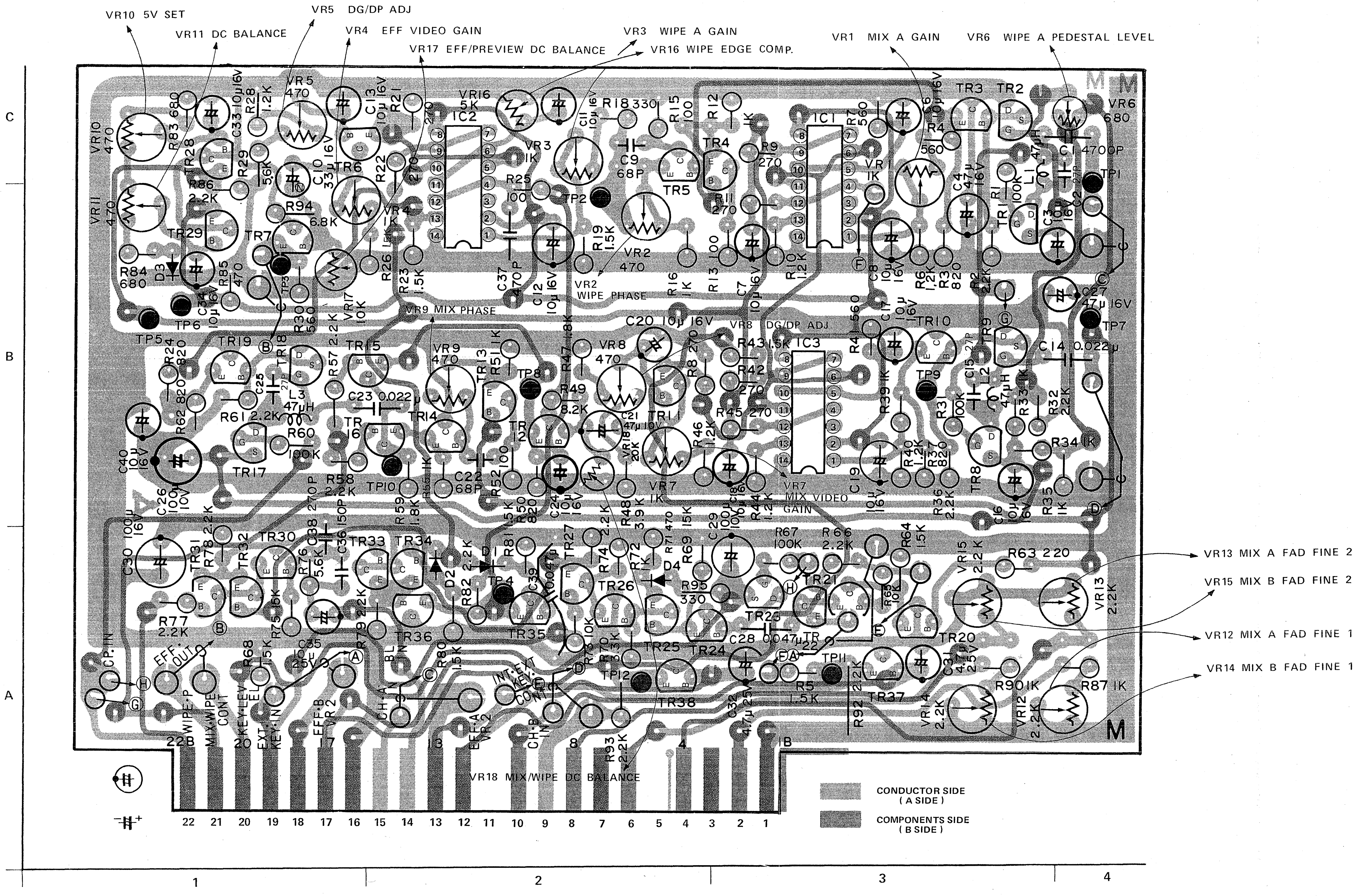
Voltages are measured by following conditions
Wipe switch → ON, 5(C/B) switch to selected.

WIPE/MIX/KEY BOARD

			TR16	2SA838-BC	E10	TR36	2SC828AR	H10
			TR17	2SK381-C	E10	TR37	2SC828AR	B7
IC1	AN-904	H4, 5	TR18	2SK19-Y	F11	TR38	2SC828AR	B8
IC2	AN-904	H8	TR19	2SC828AR	E11			
IC3	AN-904	E6	TR20	2SC828AR	E12	D1	MA162	A2
TR1	2SK381-C	H3	TR21	2SC828AR	E12	D2	MA162	A2
TR2	2SK19-Y	H3	TR22	2SA564-RS	E12	D3	MA162	B1
TR3	2SC828AR	H3	TR23	2SK381-C	E13	D4	MA162	A2
TR4	2SA564-RS	H6	TR24	2SC1047-CD	E14			
TR5	2SC828AR	H6	TR25	2SC1047-CD	E14			
TR6	2SA838-BC	H9	TR26	2SC828AR	E14			
TR7	2SC828AR	H10	TR27	2SC828AR	E15			
TR8	2SK381-C	E4	TR28	2SC828AR	H14			
TR9	2SK19-Y	E5	TR29	2SC828AR	H14			
TR10	2SC828AR	E5	TR30	2SA564-RS	H13			
TR11	2SA838-BC	F7	TR31	2SC828AR	H13			
TR12	2SC828AR	E8	TR32	2SC828AR	H12			
TR13	2SA564-RS	E8	TR33	2SA564-RS	H12			
TR14	2SC828AR	E9	TR34	2SA564-RS	H11			
TR15	2SC1047-CD	F10	TR35	2SC828AR	H11			

CONDUCTOR VIEW OF WIPE/MIX/KEY BOARD

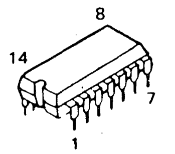
— Components Side —


VR10 5V SET
VR11 DC BALANCE
VR5 DG/DP ADJ
VR4 EFF VIDEO GAIN
VR17 EFF/PREVIEW DC BALANCE
VR3 WIPE A GAIN
VR16 WIPE EDGE COMP.
VR1 MIX A GAIN
VR6 WIPE A PEDESTAL LEVEL
VR2 WIPE PHASE
VR9 MIX PHASE
VR8 DG/DP ADJ
VR7 MIX VIDEO GAIN
VR13 MIX A FAD FINE 2
VR15 MIX B FAD FINE 2
VR12 MIX A FAD FINE 1
VR14 MIX B FAD FINE 1
VR18 MIX/WIPE DC BALANCE
IC1
IC2
IC3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
CONDUCTOR SIDE (A SIDE)
COMPONENTS SIDE (B SIDE)
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
C
B
A
1
2
3
4

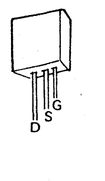
WIPE/MIX/KEY BOARD

IC1	AN-904	B, C3
IC2	AN-904	B, C2
IC3	AN-904	B3
TR1	2SK381-C	B3
TR2	2SK19-Y	C3
TR3	2SC828AR	C3
TR4	2SA564-RS	C3
TR5	2SC828AR	C2
TR6	2SA838-BC	C1
TR7	2SC828AR	B1
TR8	2SK381-C	B3
TR9	2SK19-Y	B3
TR10	2SC828AR	B3
TR11	2SA838-BC	B2
TR12	2SC828AR	B2
TR13	2SA564-RS	B2
TR14	2SC828AR	B2
TR15	2SC1047-CD	B1, 2
TR16	2SA838-BC	B2
TR17	2SK381-C	B1
TR18	2SK19-Y	B1
TR19	2SC828AR	B1
TR20	2SC828AR	A3
TR21	2SC828AR	A3
TR22	2SA564-RS	A3
TR23	2SK381-C	A3
TR24	2SC1047-CD	A2
TR25	2SC1047-CD	A2
TR26	2SC828AR	A2
TR27	2SC828AR	A2
TR28	2SC828AR	C1
TR29	2SC828AR	B1
TR30	2SA564-RS	A1
TR31	2SC828AR	A1
TR32	2SC828AR	A1
TR33	2SA564-RS	A2
TR34	2SA564-RS	A2
TR35	2SC828AR	A2
TR36	2SC828AR	A2
TR37	2SC828AR	A3
TR38	2SC828AR	A2
D1	MA162	A2
D2	MA162	A2
D3	MA162	B1
D4	MA162	A2

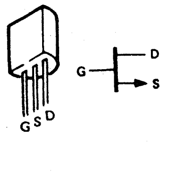
AN904



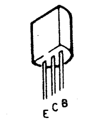
2SK19-Y



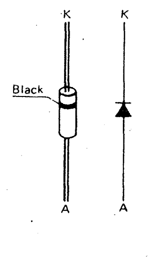
2SK34-CD



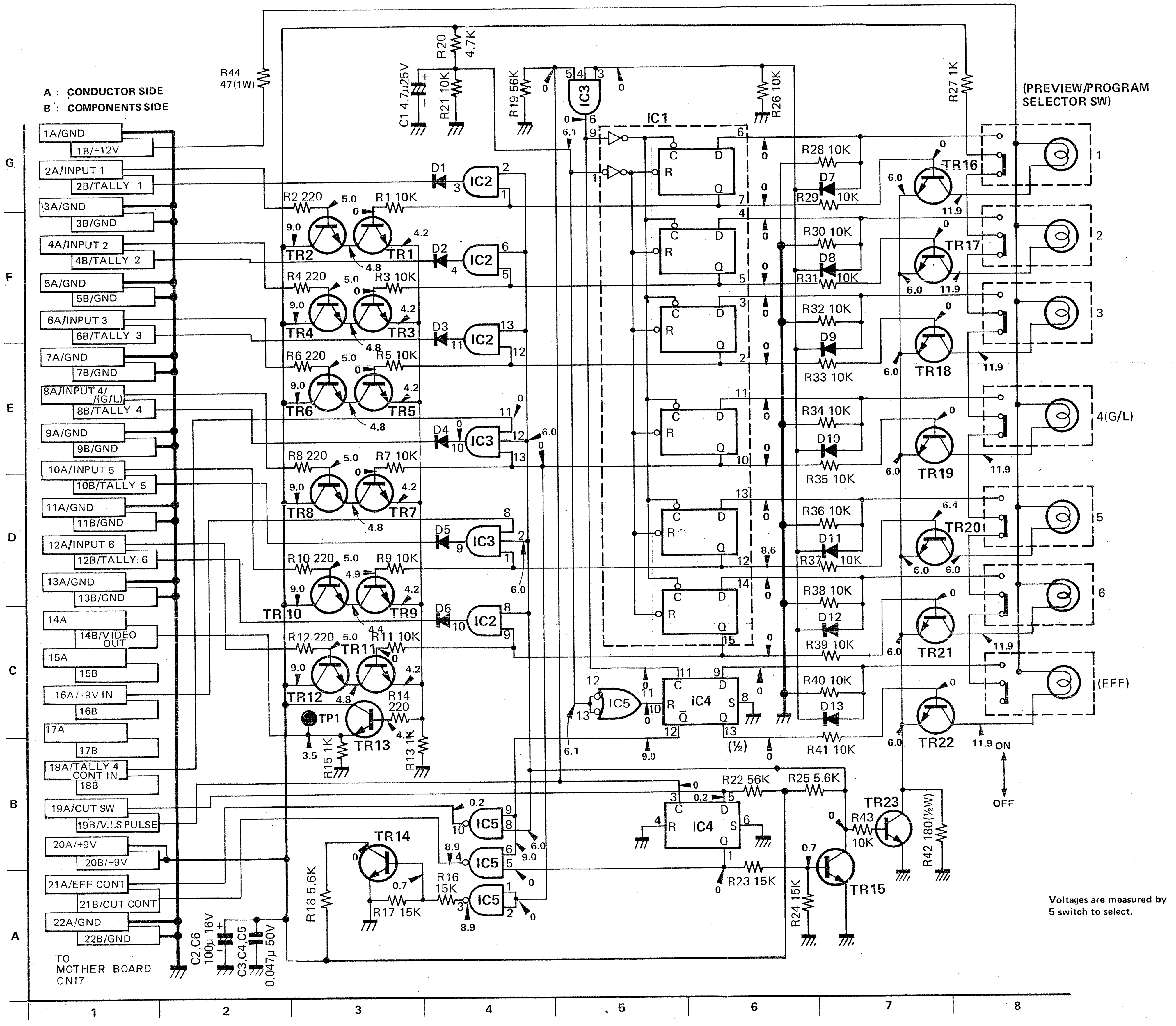
2SC1047-CD
2SC828AR
2SA838-BC
2SA564-RS



M162



SCHEMATIC DIAGRAM OF VIDEO CROSSPOINT-2 BOARD


A : CONDUCTOR SIDE
B : COMPONENTS SIDE
1A/GND
1B/+12V
2A/INPUT 1
2B/TALLY 1
3A/GND
3B/GND
4A/INPUT 2
4B/TALLY 2
5A/GND
5B/GND
6A/INPUT 3
6B/TALLY 3
7A/GND
7B/GND
8A/INPUT 4/(G/L)
8B/TALLY 4
9A/GND
9B/GND
10A/INPUT 5
10B/TALLY 5
11A/GND
11B/GND
12A/INPUT 6
12B/TALLY 6
13A/GND
13B/GND
14A
14B/VIDEO OUT
15A
15B
16A/+9V IN
16B
17A
17B
18A/TALLY 4 CONT IN
18B
19A/CUT SW
19B/V.I.S PULSE
20A/+9V
20B/+9V
21A/EFF CONT
21B/CUT CONT
22A/GND
22B/GND
TO MOTHER BOARD CN17
R44 47(1W)
C1 4.7μ25V
R20 4.7K
R21 10K
R19 56K
R26 10K
R27 1K
IC1
IC2
IC3
IC4
IC5
(½)
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR14
TR15
TR16
TR17
TR18
TR19
TR20
TR21
TR22
TR23
R1 10K
R2 220
R3 10K
R4 220
R5 10K
R6 220
R7 10K
R8 220
R9 10K
R10 220
R11 10K
R12 220
R13 1K
R14 220
R15 1K
R16 15K
R17 15K
R18 5.6K
R22 56K
R23 15K
R24 15K
R25 5.6K
R28 10K
R29 10K
R30 10K
R31 10K
R32 10K
R33 10K
R34 10K
R35 10K
R36 10K
R37 10K
R38 10K
R39 10K
R40 10K
R41 10K
R42 180(½W)
R43 10K
TP1
C2,C6 100μ 16V
C3,C4,C5 0.047μ 50V
(PREVIEW/PROGRAM SELECTOR SW)
1
2
3
4(G/L)
5
6
(EFF)
ON
OFF
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8

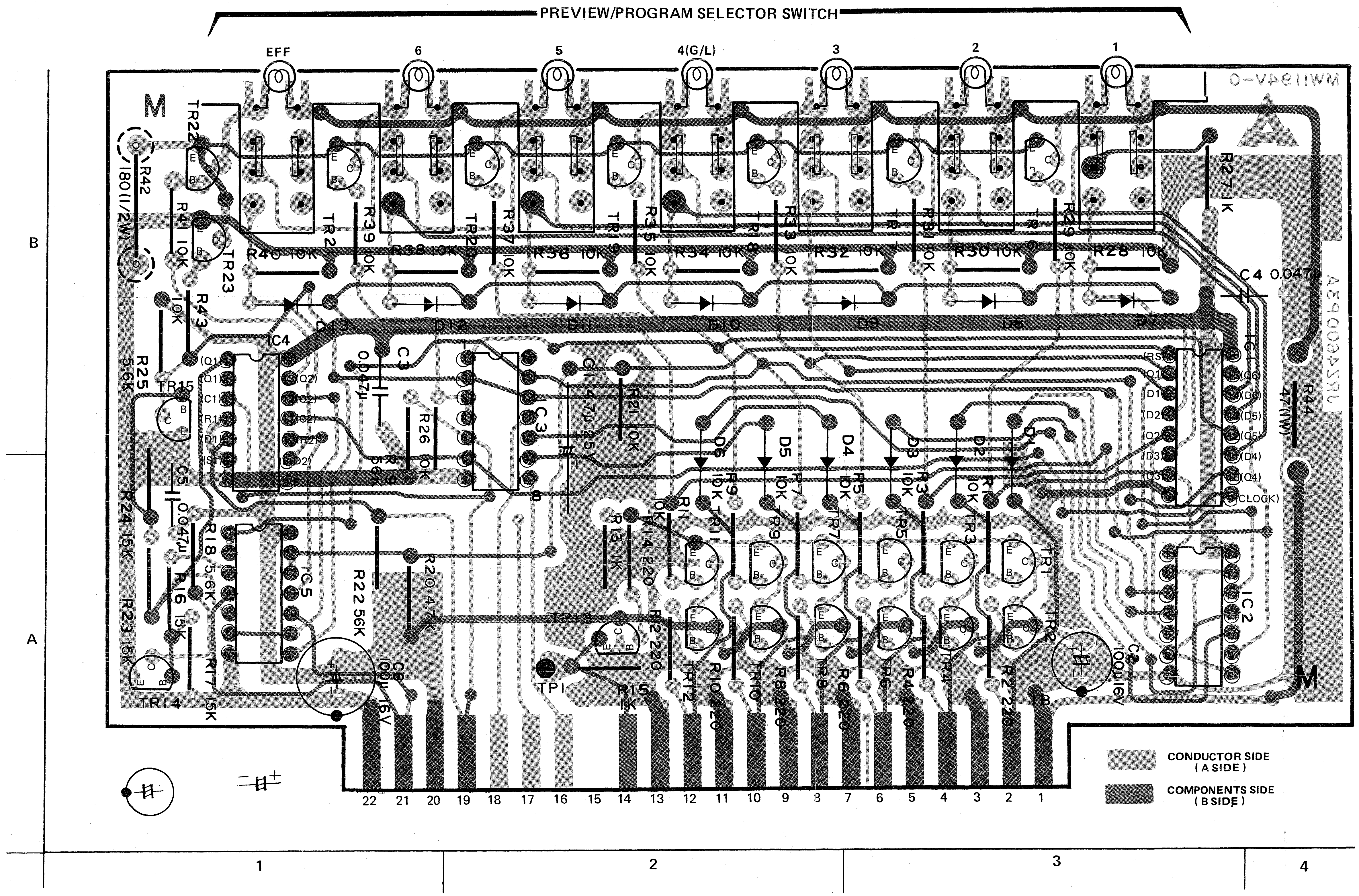
Voltages are measured by 5 switch to select.

VIDEO CROSSPOINT-2 BOARD

IC1	YWMC14174BCP	C-G6
IC2	YWMC14081BCP	C, F, G4
IC3	YWMC14073BCP	A, D, E4
IC4	YWMC14013BCP	B, C6
IC5	MN4011B	A-C4,5
TR1	2SC828AR	F3
TR2	2SC828AR	F3
TR3	2SC828AR	F3
TR4	2SC828AR	F3
TR5	2SC828AR	E3
TR6	2SC828AR	E3
TR7	2SC828AR	D3
TR8	2SC828AR	D3
TR9	2SC828AR	D3
TR10	2SC828AR	D3
TR11	2SC828AR	C3
TR12	2SC828AR	C3
TR13	2SC828AR	C3
TR14	2SC828AR	B3
TR15	2SC828AR	A7
TR16	2SC1318-RS	G7
TR17	2SC1318-RS	F7
TR18	2SC1318-RS	E7
TR19	2SC1318-RS	E7
TR20	2SC1318-RS	D7
TR21	2SC1318-RS	C7
TR22	2SC1318-RS	C7
TR23	2SC1318-RS	B7
D1	MA162	G4
D2	MA162	F4
D3	MA162	F4
D4	MA162	E4
D5	MA162	D4
D6	MA162	C4
D7	MA162	G7
D8	MA162	F7
D9	MA162	E7
D10	MA162	E7
D11	MA162	D7
D12	MA162	C7
D13	MA162	C7

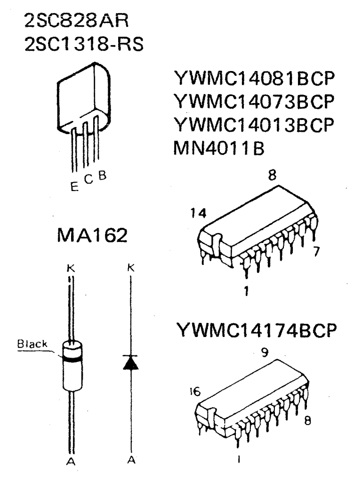
CONDUCTOR VIEW OF VIDEO CROSSPOINT-2 BOARD

— Components Side —

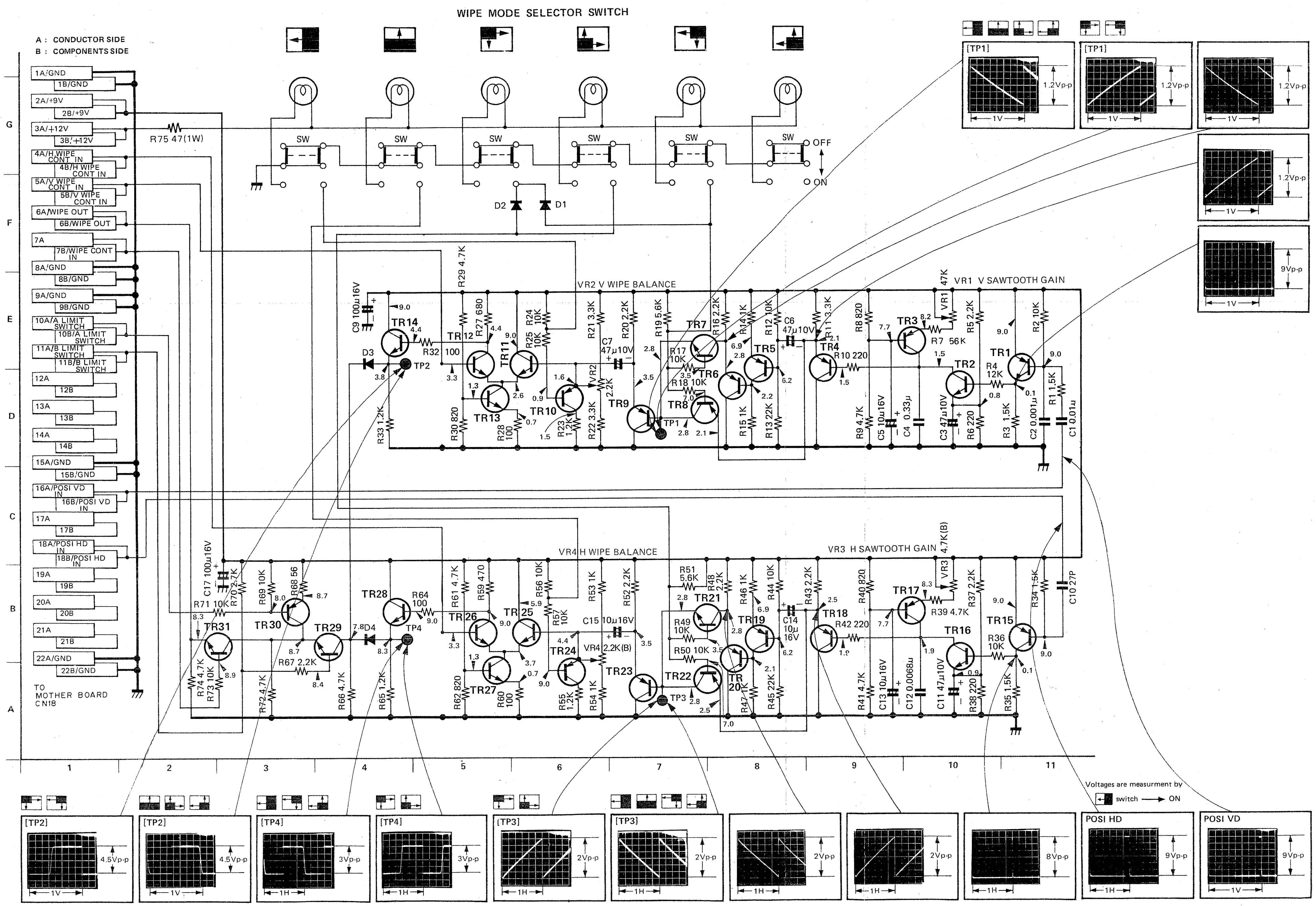

PREVIEW/PROGRAM SELECTOR SWITCH
EFF
6
5
4(G/L)
3
2
1
M
TR22
R42 180(1/2W)
R41 10K
TR23
R40 10K
TR21
R39 10K
R38 10K
TR20
R37 10K
R36 10K
TR19
R35 10K
R34 10K
TR18
R33 10K
R32 10K
TR17
R31 10K
R30 10K
TR16
R29 10K
R28 10K
R27 1K
C4 0.047μ
R43 10K
D13
D12
D11
D10
D9
D8
D7
IC4
C3 0.047μ
IC3
C1 4.7μ 25V
R21 10K
R26 10K
R19 56K
IC1
R44 47(1W)
R25 5.6K
TR15
C5 0.047μ
R24 15K
R18 5.6K
R16 15K
R23 15K
R17 15K
TR14
IC5
R22 56K
R20 4.7K
C6 100μ 16V
D6
D5
D4
D3
D2
D1
R11 10K
R9 10K
R7 10K
R5 10K
R3 10K
R1 10K
TR11
TR9
TR7
TR5
TR3
TR1
R13 1K
R14 220
TR13
R12 220
TR12
R10 220
TR10
R8 220
TR8
R6 220
TR6
R4 220
TR4
R2 220
TR2
C2 100μ 16V
IC2
R15 1K
TP1
1B
MW1194V-0
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
CONDUCTOR SIDE (A SIDE)
COMPONENTS SIDE (B SIDE)
B
A
1
2
3
4

VIDEO CROSSPOINT-2 BOARD

IC1	YWMC14174BCP	B3
IC2	YWMC14081BCP	A3
IC3	YWMC14073BCP	B2
IC4	YWMC14013BCP	B1
IC5	MN4011B	A1
TR1	2SC828AR	A3
TR2	2SC828AR	A3
TR3	2SC828AR	A3
TR4	2SC828AR	A3
TR5	2SC828AR	A3
TR6	2SC828AR	A3
TR7	2SC828AR	A2
TR8	2SC828AR	A2
TR9	2SC828AR	A2
TR10	2SC828AR	A2
TR11	2SC828AR	A2
TR12	2SC828AR	A2
TR13	2SC828AR	A2
TR14	2SC828AR	A1
TR15	2SC828AR	B1
TR16	2SC1318-RS	B3
TR17	2SC1318-RS	B3
TR18	2SC1318-RS	B2
TR19	2SC1318-RS	B2
TR20	2SC1318-RS	B2
TR21	2SC1318-RS	B1
TR22	2SC1318-RS	B1
TR23	2SC1318-RS	B1
D1	MA162	A3
D2	MA162	A3
D3	MA162	A3
D4	MA162	A2
D5	MA162	A2
D6	MA162	A2
D7	MA162	B3
D8	MA162	B3
D9	MA162	B2
D10	MA162	B2
D11	MA162	B2
D12	MA162	B1
D13	MA162	B1


2SC828AR
2SC1318-RS
E C B
YWMC14081BCP
YWMC14073BCP
YWMC14013BCP
MN4011B
14
8
7
1
MA162
K
K
Black
A
A
YWMC14174BCP
9
16
8
1

SCHEMATIC DIAGRAM OF WAVEFORM GENERATOR BOARD

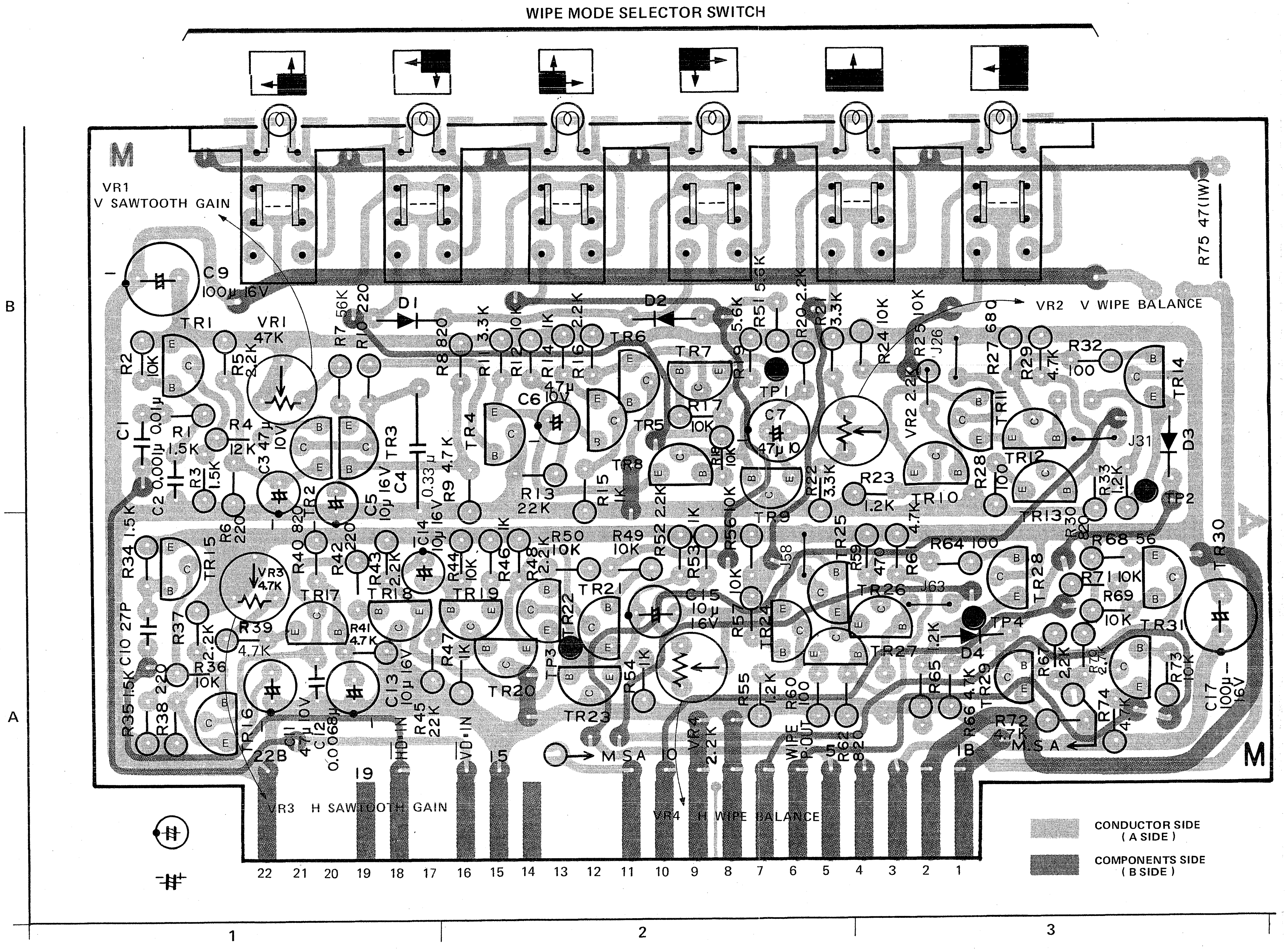

WIPE MODE SELECTOR SWITCH
A : CONDUCTOR SIDE
B : COMPONENTS SIDE
1A/GND
1B/GND
2A/+9V
2B/+9V
3A/+12V
3B/+12V
4A/H WIPE CONT IN
4B/H WIPE CONT IN
5A/V WIPE CONT IN
5B/V WIPE CONT IN
6A/WIPE OUT
6B/WIPE OUT
7A
7B/WIPE CONT IN
8A/GND
8B/GND
9A/GND
9B/GND
10A/A LIMIT SWITCH
10B/A LIMIT SWITCH
11A/B LIMIT SWITCH
11B/B LIMIT SWITCH
12A
12B
13A
13B
14A
14B
15A/GND
15B/GND
16A/POSI VD IN
16B/POSI VD IN
17A
17B
18A/POSI HD IN
18B/POSI HD IN
19A
19B
20A
20B
21A
21B
22A/GND
22B/GND
TO MOTHER BOARD CN18
R75 47(1W)
SW
OFF
ON
D2
D1
D3
D4
VR2 V WIPE BALANCE
VR1 V SAWTOOTH GAIN
VR4 H WIPE BALANCE
VR3 H SAWTOOTH GAIN
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR14
TR15
TR16
TR17
TR18
TR19
TR20
TR21
TR22
TR23
TR24
TR25
TR26
TR27
TR28
TR29
TR30
TR31
TP1
TP2
TP3
TP4
C9 100µ16V
C7 47µ10V
C6 47µ10V
C5 10µ16V
C4 0.33µ
C3 47µ10V
C2 0.001µ
C1 0.01µ
C17 100µ16V
C15 10µ16V
C14 10µ 16V
C13 10µ16V
C12 0.0068µ
C11 47µ10V
C10 27P
R29 4.7K
R32 100
R33 1.2K
R30 820
R27 680
R25 10K
R24 10K
R28 100
R23 1.2K
R22 3.3K
R21 3.3K
R20 2.2K
R19 5.6K
R17 10K
R18 10K
R16 2.2K
R14 1K
R15 1K
R13 22K
R12 10K
R11 3.3K
R10 220
R9 4.7K
R8 820
R7 56K
R6 220
R5 2.2K
R4 12K
R3 1.5K
R2 10K
R1 1.5K
VR1 47K
VR2 2.2K
R74 4.7K
R73 10K
R72 4.7K
R71 10K
R70 2.7K
R69 10K
R68 56
R67 2.2K
R66 4.7K
R65 1.2K
R64 100
R62 820
R61 4.7K
R60 100
R59 470
R57 10K
R56 10K
R55 1.2K
R54 1K
R53 1K
R52 2.2K
R51 5.6K
R50 10K
R49 10K
R48 2.2K
R47 1K
R46 1K
R45 22K
R44 10K
R43 2.2K
R42 220
R41 4.7K
R40 820
R39 4.7K
R38 220
R37 2.2K
R36 10K
R35 1.5K
R34 1.5K
VR3 4.7K(B)
VR4 2.2K(B)
[TP1]
1.2Vp-p
1V
9Vp-p
[TP2]
4.5Vp-p
[TP3]
[TP4]
3Vp-p
2Vp-p
8Vp-p
1H
POSI HD
POSI VD
Voltages are measurment by
switch ——→ ON
A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10
11

WAVEFORM GENERATOR BOARD

TR1	2SA564-RS	E11
TR2	2SC828AR	E10
TR3	2SA564 RS	E10
TR4	2SA564-RS	E9
TR5	2SA564-RS	E8
TR6	2SA564-RS	D8
TR7	2SC828AR	E7
TR8	2SA564-RS	D7
TR9	2SA564-RS	D7
TR10	2SA564-RS	D6
TR11	2SC828AR	E6
TR12	2SC828AR	E5
TR13	2SC828AR	D5
TR14	2SC828AR	E4
TR15	2SA564-RS	B11
TR16	2SC828AR	B10
TR17	2SA564-RS	B10
TR18	2SA564-RS	B9
TR19	2SA564-RS	B8
TR20	2SA564-RS	B8
TR21	2SC828AR	B7
TR22	2SA564-RS	A7
TR23	2SA564-RS	A7
TR24	2SA564-RS	A6
TR25	2SC828AR	B6
TR26	2SC828AR	B5
TR27	2SC828AR	A5
TR28	2SC828AR	B4
TR29	2SC828AR	B4
TR30	2SA564-RS	B3
TR31	2SC828AR	B3
D1	MA162	F6
D2	MA162	F6
D3	MA162	E4
D4	MA162	B4

CONDUCTOR VIEW OF WAVEFORM GENERATOR BOARD

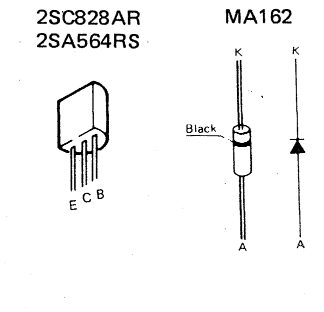
— Components Side —


WIPE MODE SELECTOR SWITCH
M
VR1
V SAWTOOTH GAIN
VR2 V WIPE BALANCE
VR3 H SAWTOOTH GAIN
VR4 H WIPE BALANCE
R75 47(1W)
C9 100μ 16V
C17 100μ 16V
TP1
TP2
TP3
TP4
D1
D2
D3
D4
J26
J31
J63
M S A
M.S A
HD-IN
VD-IN
WIPE P.OUT
22B
19
15
10
5
1B
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
B
A
1
2
3
CONDUCTOR SIDE (A SIDE)
COMPONENTS SIDE (B SIDE)

WAVEFORM GENERATOR BOARD

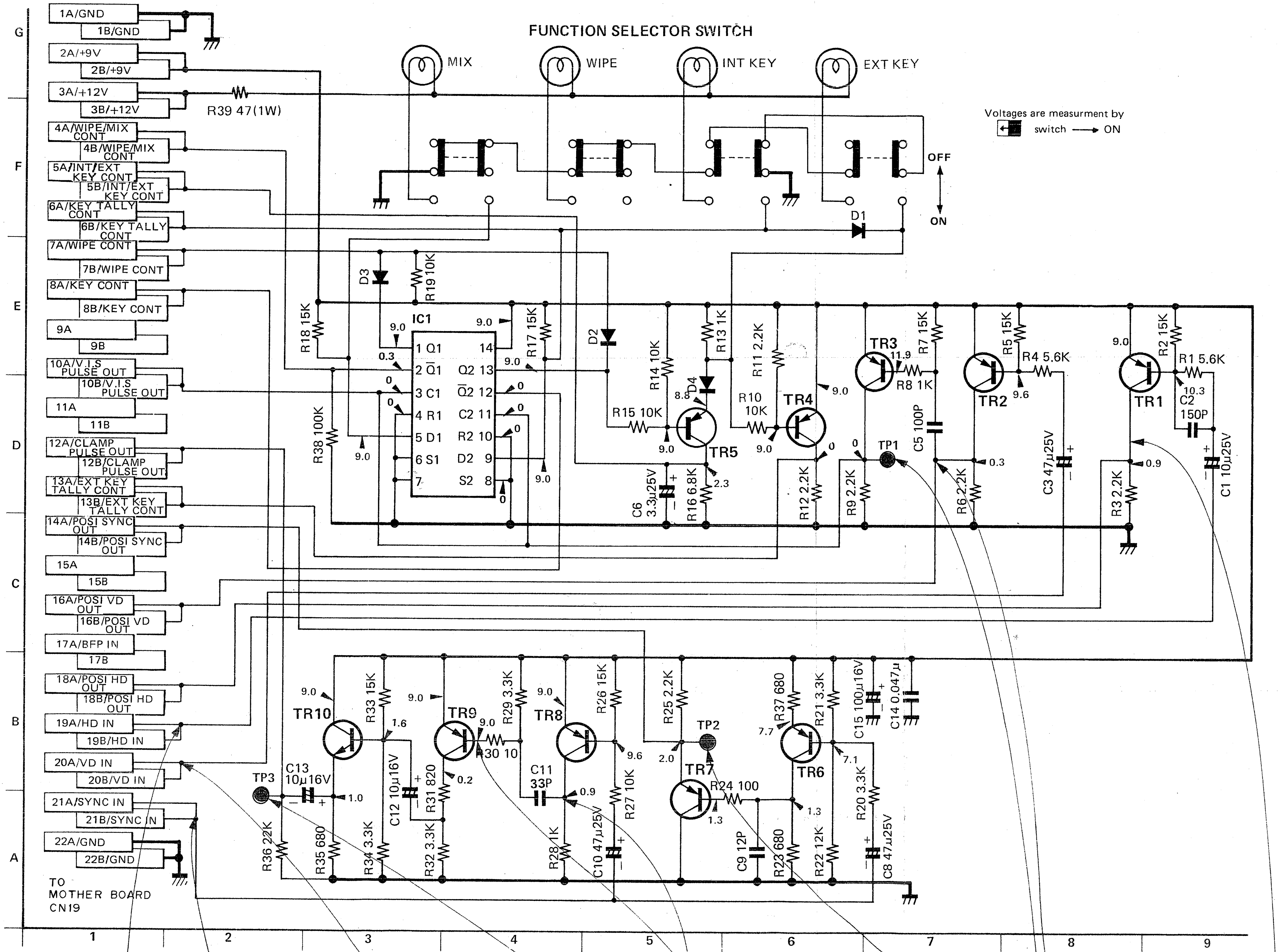
TR1	2SA564-RS	B1
TR2	2SC828AR	B1
TR3	2SA564 RS	B1
TR4	2SA564-RS	B2
TR5	2SA564-RS	B2
TR6	2SA564-RS	B2
TR7	2SC828AR	B2
TR8	2SA564-RS	B2
TR9	2SA564-RS	B2
TR10	2SA564-RS	B3
TR11	2SC828AR	B3
TR12	2SC828AR	B3
TR13	2SC828AR	B3
TR14	2SC828AR	B3
TR15	2SA564-RS	A1
TR16	2SC828AR	A1
TR17	2SA564-RS	A1
TR18	2SA564-RS	A1
TR19	2SA564-RS	A2
TR20	2SA564-RS	A2
TR21	2SC828AR	A2
TR22	2SA564-RS	A2
TR23	2SA564-RS	A2
TR24	2SA564-RS	A2
TR25	2SC828AR	A2
TR26	2SC828AR	A3
TR27	2SC828AR	A2
TR28	2SC828AR	A3
TR29	2SC828AR	A3
TR30	2SA564-RS	A3
TR31	2SC828AR	A3
D1	MA162	B1
D2	MA162	B2
D3	MA162	B3
D4	MA162	A3

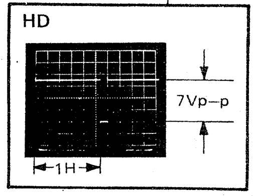
VR1	V SAWTOOTH GAIN
VR2	V WIPE BALANCE
VR3	H SAWTOOTH GAIN
VR4	H WIPE BALANCE

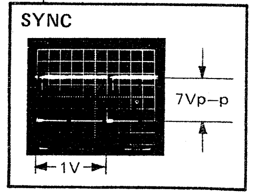

2SC828AR
2SA564RS
E C B
MA162
Black
K
K
A
A

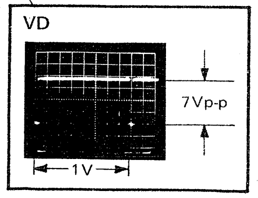
SCHEMATIC DIAGRAM OF WAVEFORM PROCESSOR BOARD

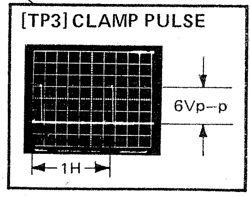
A : CONDUCTOR SIDE
B : COMPONENTS SIDE

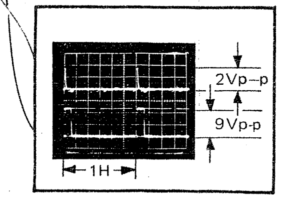

1A/GND
1B/GND
2A/+9V
2B/+9V
3A/+12V
3B/+12V
R39 47(1W)
4A/WIPE/MIX CONT
4B/WIPE/MIX CONT
5A/INT/EXT KEY CONT
5B/INT/EXT KEY CONT
6A/KEY TALLY CONT
6B/KEY TALLY CONT
7A/WIPE CONT
7B/WIPE CONT
8A/KEY CONT
8B/KEY CONT
9A
9B
10A/V.I.S PULSE OUT
10B/V.I.S PULSE OUT
11A
11B
12A/CLAMP PULSE OUT
12B/CLAMP PULSE OUT
13A/EXT KEY TALLY CONT
13B/EXT KEY TALLY CONT
14A/POSI SYNC OUT
14B/POSI SYNC OUT
15A
15B
16A/POSI VD OUT
16B/POSI VD OUT
17A/BFP IN
17B
18A/POSI HD OUT
18B/POSI HD OUT
19A/HD IN
19B/HD IN
20A/VD IN
20B/VD IN
21A/SYNC IN
21B/SYNC IN
22A/GND
22B/GND
TO MOTHER BOARD CN19
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
FUNCTION SELECTOR SWITCH
MIX
WIPE
INT KEY
EXT KEY
Voltages are measurment by switch ⟶ ON
OFF
ON
D1
D2
D3
D4
R19 10K
IC1
1 Q1
2 Q̄1
3 C1
4 R1
5 D1
6 S1
7
14
Q2 13
Q̄2 12
C2 11
R2 10
D2 9
S2 8
R18 15K
R17 15K
R38 100K
R14 10K
R13 1K
R15 10K
R11 2.2K
R10 10K
R16 6.8K
C6 3.3μ25V
TR5
TR4
R12 2.2K
TR3
R7 15K
R8 1K
R9 2.2K
TP1
C5 100P
TR2
R5 15K
R4 5.6K
R6 2.2K
C3 47μ25V
TR1
R2 15K
R1 5.6K
C2 150P
C1 10μ25V
R3 2.2K
9.0
0.3
0
2.3
8.8
11.9
10.3
9.6
0.9
TR10
R33 15K
1.6
TR9
R29 3.3K
R30 10
TR8
R26 15K
R25 2.2K
TP2
R37 680
R21 3.3K
C15 100μ16V
C14 0.047μ
TP3
C13 10μ16V
1.0
C12 10μ16V
R31 820
0.2
C11 33P
R27 10K
TR7
R24 100
TR6
R20 3.3K
C8 47μ25V
R36 22K
R35 680
R34 3.3K
R32 3.3K
R28 1K
C10 47μ25V
C9 12P
R23 680
R22 12K
2.0
7.7
7.1
1.3

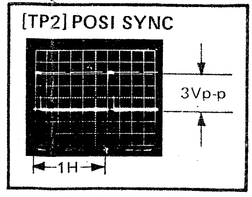


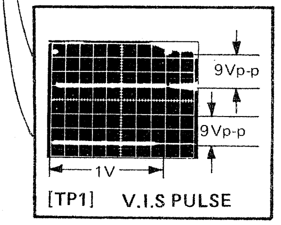




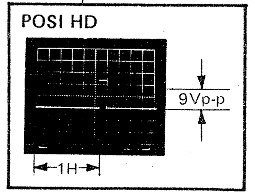








[TP1] V.I.S PULSE

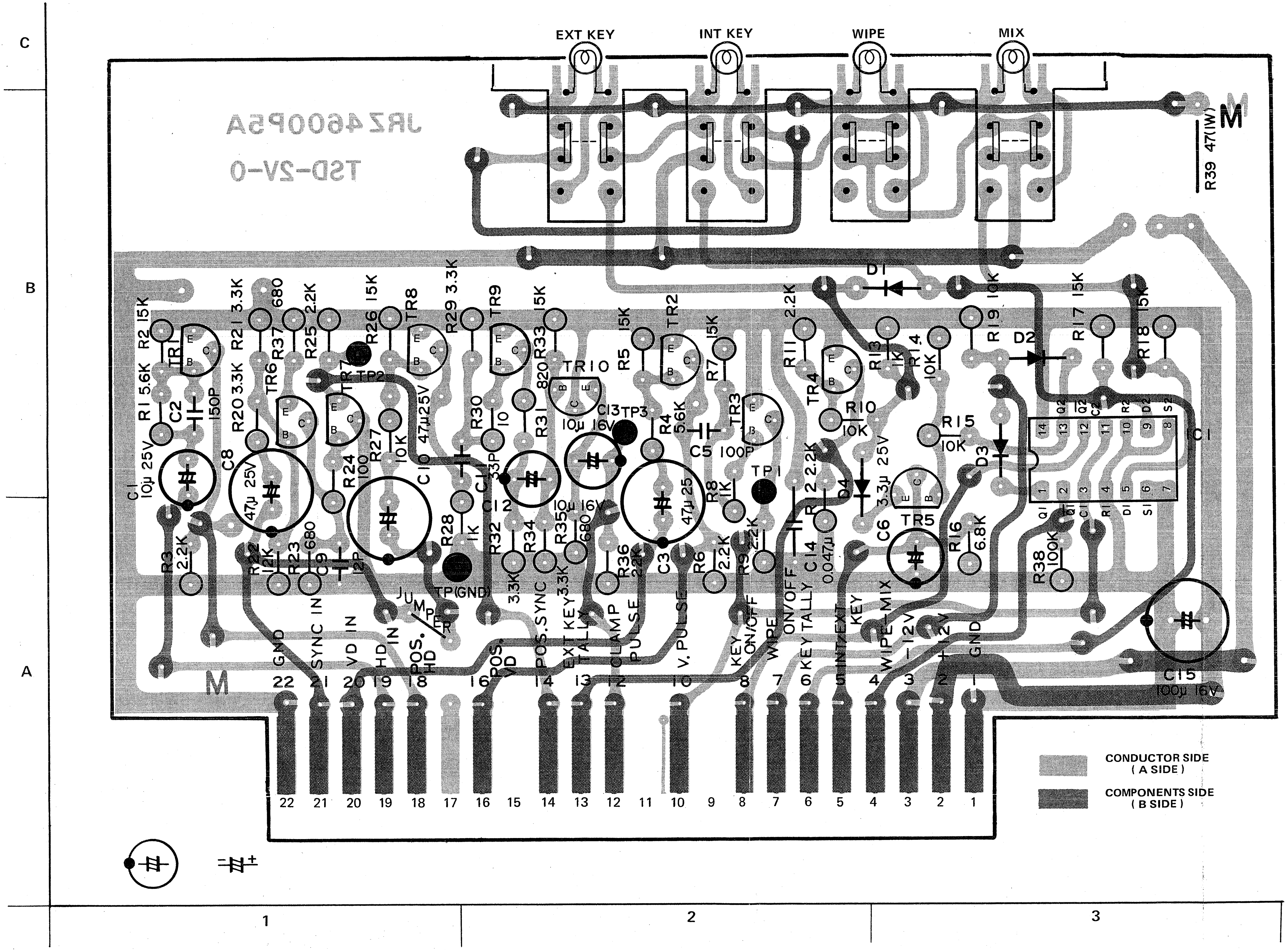


WAVEFORM PROCESSOR BOARD

IC1	YWMC14013BCP	D3, 4
TR1	2SA564-RS	D8
TR2	2SA564-RS	D7
TR3	2SA564-RS	D6
TR4	2SA564-RS	D6
TR5	2SA564-RS	D5
TR6	2SA564-RS	B6
TR7	2SA564-RS	B5
TR8	2SA564-RS	B4
TR9	2SA564-RS	B4
TR10	2SC828AR	B3
D1	MA162	F6
D2	MA162	D5
D3	MA162	E3
D4	MA162	D5

CONDUCTOR VIEW OF WAVEFORM PROCESSOR BOARD

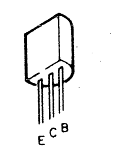
— Components Side —


C
B
A
1
2
3
EXT KEY
INT KEY
WIPE
MIX
M
R39 47(1W)
D1
D2
D3
D4
IC1
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
R1 5.6K
R2 15K
R3 2.2K
R4 5.6K
R5 15K
R6 2.2K
R7 15K
R8 1K
R9 2.2K
R10 10K
R11 2.2K
R12 2.2K
R13 1K
R14 10K
R15 10K
R16 6.8K
R17 15K
R18 15K
R19 10K
R20 3.3K
R21 3.3K
R22 12K
R23 680
R24 100
R25 2.2K
R26 15K
R27 10K
R28 1K
R29 3.3K
R30 10
R31 820
R32 3.3K
R33 15K
R34 3.3K
R35 680
R36 22K
R37 680
R38 100K
C1 10µ 25V
C2 150P
C3 47µ 25
C5 100P
C6 3.3µ 25V
C8 47µ 25V
C9 12P
C10 47µ 25V
C11 33P
C12
C13 10µ 16V
C14 0.047µ
C15 100µ 16V
TP1
TP2
TP3
TP(GND)
JUMPER
GND
SYNC IN
VD IN
HD IN
POS. HD
POS. VD
POS. SYNC
EXT KEY TALLY
CLAMP PULSE
V. PULSE
KEY ON/OFF
WIPE
ON/OFF KEY TALLY
INT/EXT KEY
WIPE-MIX
−12V
+12V
GND
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
CONDUCTOR SIDE (A SIDE)
COMPONENTS SIDE (B SIDE)

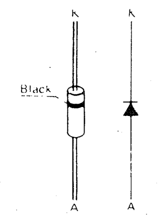
WAVEFORM PROCESSOR BOARD

IC1	YWMC14013BCP	B3
TR1	2SA564-RS	B1
TR2	2SA564-RS	B2
TR3	2SA564-RS	B2
TR4	2SA564-RS	B2
TR5	2SA564-RS	B3
TR6	2SA564-RS	B1
TR7	2SA564-RS	B1
TR8	2SA564-RS	B1
TR9	2SA564-RS	B2
TR10	2SC828AR	B2
D1	MA162	B3
D2	MA162	B3
D3	MA162	B3
D4	MA162	B2

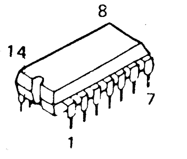
2SC828AR
2SA564-RS



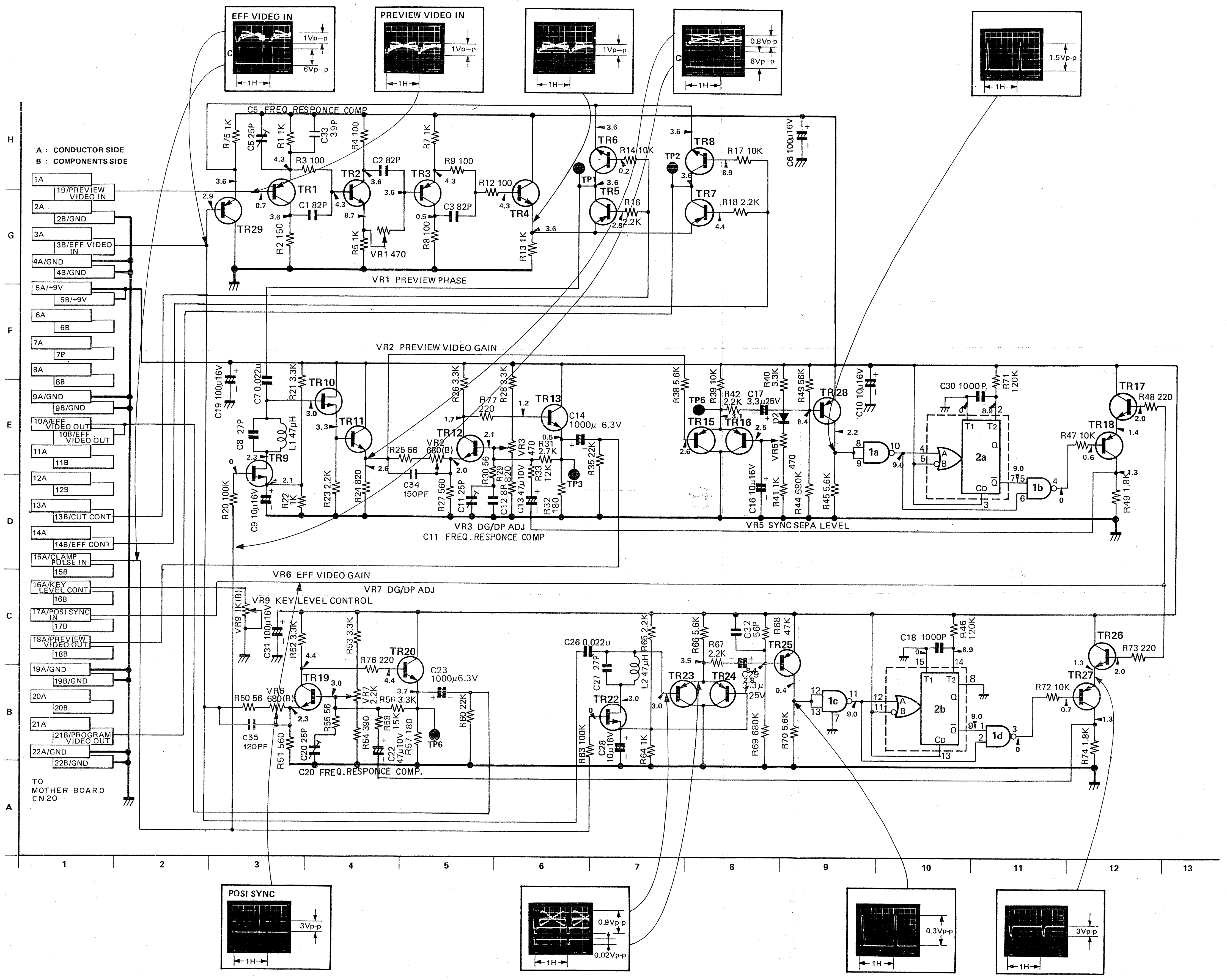
MA162



YWMC14013BCP



SCHEMATIC DIAGRAM OF PREVIEW/EFFECT OUTPUT BOARD

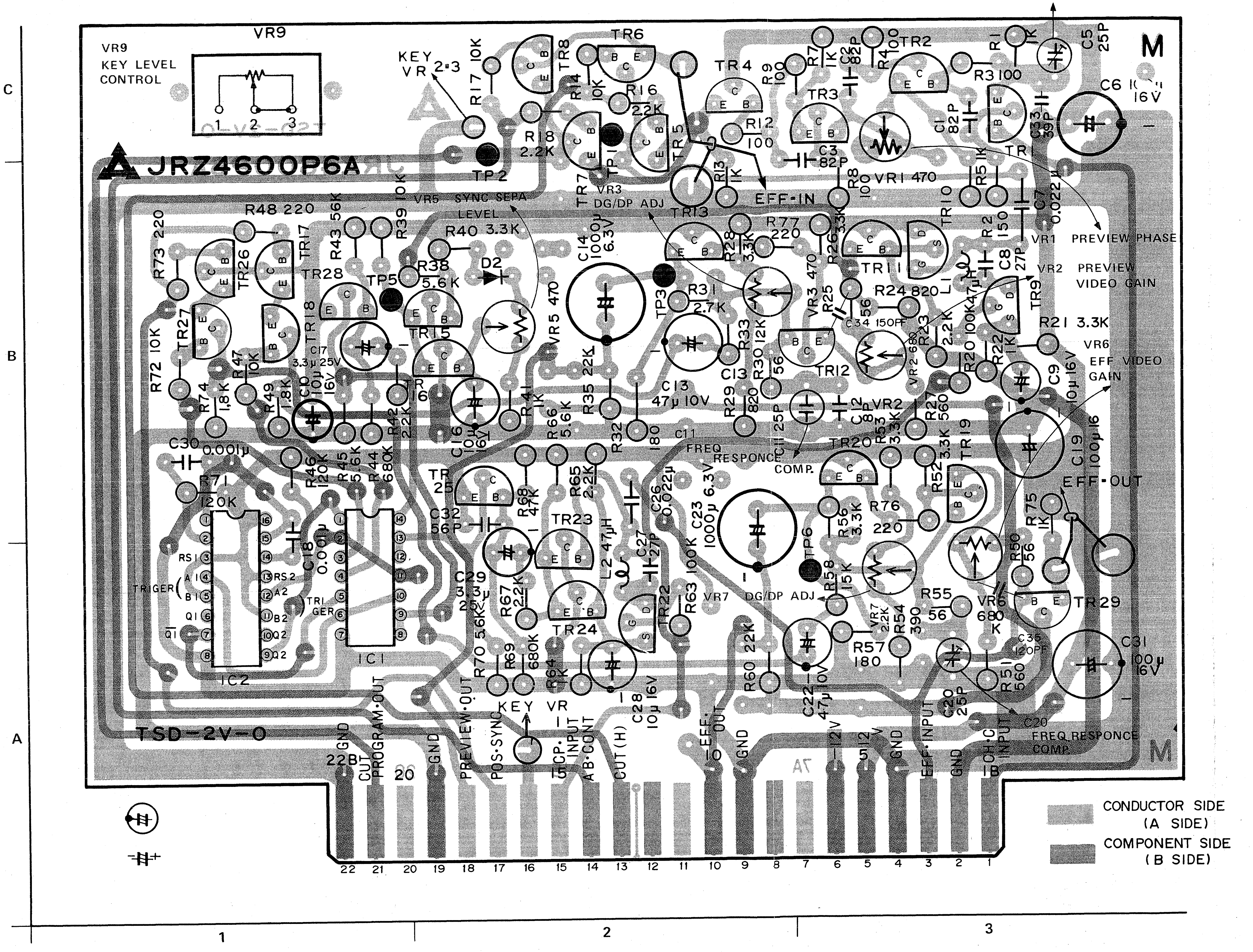

EFF VIDEO IN
1Vp-p
6Vp-p
1H
PREVIEW VIDEO IN
1Vp-p
0.8Vp-p
1.5Vp-p
A : CONDUCTOR SIDE
B : COMPONENTS SIDE
1A
1B/PREVIEW VIDEO IN
2A
2B/GND
3A
3B/EFF VIDEO IN
4A/GND
4B/GND
5A/+9V
5B/+9V
6A
6B
7A
7B
8A
8B
9A/GND
9B/GND
10A/EFF VIDEO OUT
10B/EFF VIDEO OUT
11A
11B
12A
12B
13A
13B/CUT CONT
14A
14B/EFF CONT
15A/CLAMP PULSE IN
15B
16A/KEY LEVEL CONT
16B
17A/POSI SYNC IN
17B
18A/PREVIEW VIDEO OUT
18B
19A/GND
19B/GND
20A
20B
21A
21B/PROGRAM VIDEO OUT
22A/GND
22B/GND
TO MOTHER BOARD CN20
C5 FREQ.RESPONCE COMP
VR1 PREVIEW PHASE
VR2 PREVIEW VIDEO GAIN
VR3 DG/DP ADJ
C11 FREQ.RESPONCE COMP
VR5 SYNC SEPA LEVEL
VR6 EFF VIDEO GAIN
VR7 DG/DP ADJ
VR9 KEY LEVEL CONTROL
C20 FREQ.RESPONCE COMP.
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR15
TR16
TR17
TR18
TR19
TR20
TR22
TR23
TR24
TR25
TR26
TR27
TR28
TR29
TP1
TP2
TP3
TP5
TP6
1a
1b
1c
1d
2a
2b
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
POSI SYNC
3Vp-p
0.9Vp-p
0.02Vp-p
0.3Vp-p
3Vp-p

PREVIEW/EFFECT OUTPUT BOARD

IC1	MN4011B	B, E9, 11
IC2	YWMC14528BCP	B, E10
TR1	2SA564-RS	G3
TR2	2SC828AR	G4
TR3	2SA564-RS	G5
TR4	2SC828AR	G6
TR5	2SA838-BC	G7
TR6	2SC1047-CD	H7
TR7	2SA838-BC	G8
TR8	2SC1047-CD	H8
TR9	2SK381-C	D3
TR10	2SK19-Y	E4
TR11	2SC828AR	E4
TR12	2SC1047-CD	E5
TR13	2SC1383-PQ	E6
TR15	2SA564-RS	E7
TR16	2SA564-RS	E8
TR17	2SC828AR	E12
TR18	2SA838-BC	E12
TR19	2SC1047-CD	B3
TR20	2SC1383-PQ	B5
TR22	2SK381-C	B7
TR23	2SA564-RS	B7
TR24	2SA564-RS	B8
TR25	2SA564-RS	B9
TR26	2SC828AR	C12
TR27	2SA564-RS	B12
TR28	2SA564-RS	E9
TR29	2SA838-BC	G3
D2	MA162	E9

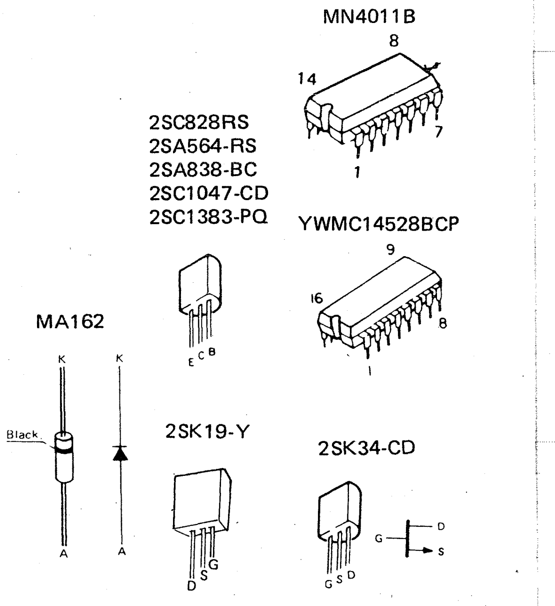
CONDUCTOR VIEW OF PREVIEW/EFFECT OUTPUT BOARD

— Components Side —

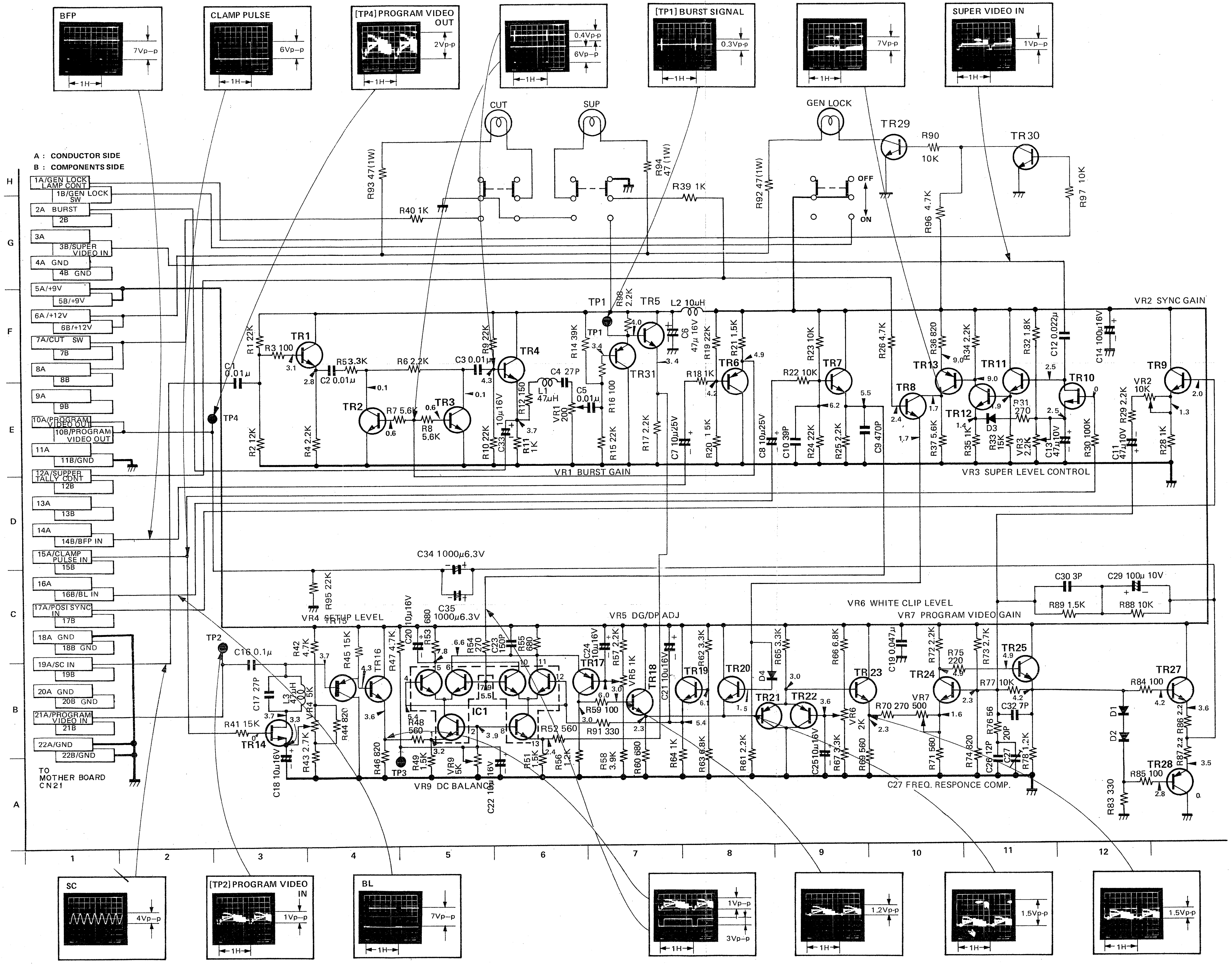

C5 FREQ. RESPONCE COMP.
VR9
VR9 KEY LEVEL CONTROL
1 2 3
JRZ4600P6A
TSD-2V-0
M
KEY VR 2·3
TP2
TP1
TP3
TP5
TP6
VR5 SYNC SEPA LEVEL
VR3 DG/DP ADJ
VR7 DG/DP ADJ
EFF·IN
EFF·OUT
VR1 PREVIEW PHASE
VR2 PREVIEW VIDEO GAIN
VR6 EFF VIDEO GAIN
C11 FREQ RESPONCE COMP.
C20 FREQ RESPONCE COMP.
IC1
IC2
RS1
A1
B1
Q1
RS2
A2
B2
Q2
TRIGER
TRI GER
R48 220
R73 220
R72 10K
R74 1.8K
R47 10K
R49 1.8K
R43 56K
R39 10K
R40 3.3K
R38 5.6K
D2
R17 10K
R14 10K
R18 2.2K
R16 22K
R12 100
R13 1K
R9 100
R7 1K
C2 82P
R4 100
R1 1K
C5 25P
C6 10μ 16V
R3 100
C1 82P
C33 39P
C3 82P
R8 100
VR1 470
R5 1K
R2 150
C7 0.022μ
C8 27P
R77 220
R28 3.3K
R26 3.3K
R24 820
L1 100K 4.7μH
R21 3.3K
C14 1000μ 6.3V
R31 2.7K
R33 12K
R30 12K
VR3 470
R25 56
C34 150PF
VR2 680
R23 2.2K
R20 100K
R22 1K
C9 10μ 16V
C17 3.3μ 25V
C10 10μ 16V
VR5 470
R35 22K
C13 47μ 10V
R29 820
C11 25P
C12 8P
R53 3.3K
R27 560
R52 3.3K
C19 100μ 16
C30 0.001μ
R71 120K
R46 120K
R45 5.6K
R44 680K
R42 2.2K
C16 10μ 16V
R41 1K
R66 5.6K
R32 180
C32 56P
R68 47K
R65 2.2K
C26 0.022μ
C23 1000μ 6.3V
R56 3.3K
R76 220
R75 1K
R50 56
C18 0.001μ
C29 3.3μ 25V
R67 2.2K
L2 47μH
C27 27P
R63 100K
R58 15K
VR7 2.2K
R55 56
R54 390
VR6 680
C35 120PF
C31 100μ 16V
R70 5.6K
R69 680K
R64 1K
C28 10μ 16V
R60 22K
C22 47μ 10V
R57 180
R51 560
C20 25P
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR15
TR16
TR17
TR18
TR19
TR20
TR22
TR23
TR24
TR25
TR26
TR27
TR28
TR29
E C B
G D S
22B
CUT
PROGRAM·OUT
20
GND
PREVIEW·OUT
POS·SYNC
KEY VR
15
CP. INPUT
AB·CONT
CUT (H)
EFF· OUT
GND
-12V
12V
GND
EFF·INPUT
GND
CH·C INPUT
B
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
C
B
A
1
2
3
▨ CONDUCTOR SIDE (A SIDE)
▨ COMPONENT SIDE (B SIDE)

PREVIEW/EFFECT OUTPUT BOARD

IC1	MN4011B	A1
IC2	YWMC14528BCP	A1
TR1	2SA564-RS	C3
TR2	2SC828AR	C3
TR3	2SA564-RS	C3
TR4	2SC828AR	C2
TR5	2SA838-BC	C2
TR6	2SC1047-CD	C2
TR7	2SA838-BC	C2
TR8	2SC1047-CD	C2
TR9	2SK381-C	B3
TR10	2SK19-Y	B3
TR11	2SC828AR	B3
TR12	2SC1047-CD	B3
TR13	2SC1383-PQ	B2
TR15	2SA564-RS	B2
TR16	2SA564-RS	B2
TR17	2SC828AR	B1
TR18	2SA838-BC	B1
TR19	2SC1047-CD	B3
TR20	2SC1383-PQ	B3
TR22	2SK381-C	A2
TR23	2SA564-RS	A2
TR24	2SA564-RS	A2
TR25	2SA564-RS	B2
C/V	S/D	
TR26	2SC828AR	B1
TR27	2SA564-RS	B1
TR28	2SA564-RS	B1
TR29	2SA838-BC	A3
D2	MA162	B2


MN4011B
14
8
7
1
2SC828RS
2SA564-RS
2SA838-BC
2SC1047-CD
2SC1383-PQ
E C B
YWMC14528BCP
9
16
8
1
MA162
K
Black
A
2SK19-Y
D S G
2SK34-CD
G S D
G
D
S

SCHEMATIC DIAGRAM OF PROGRAM OUTPUT BOARD


BFP
7Vp-p
CLAMP PULSE
6Vp-p
[TP4] PROGRAM VIDEO OUT
2Vp-p
0.4Vp-p
6Vp-p
[TP1] BURST SIGNAL
0.3Vp-p
7Vp-p
SUPER VIDEO IN
1Vp-p
1H
A : CONDUCTOR SIDE
B : COMPONENTS SIDE
1A/GEN LOCK LAMP CONT
1B/GEN LOCK SW
2A BURST
2B
3A
3B/SUPER VIDEO IN
4A GND
4B GND
5A/+9V
5B/+9V
6A/+12V
6B/+12V
7A/CUT SW
7B
8A
8B
9A
9B
10A/PROGRAM VIDEO OUT
10B/PROGRAM VIDEO OUT
11A
11B/GND
12A/SUPPER TALLY CONT
12B
13A
13B
14A
14B/BFP IN
15A/CLAMP PULSE IN
15B
16A
16B/BL IN
17A/POSI SYNC IN
17B
18A GND
18B GND
19A/SC IN
19B
20A GND
20B GND
21A/PROGRAM VIDEO IN
21B
22A/GND
22B/GND
TO MOTHER BOARD CN21
CUT
SUP
GEN LOCK
OFF
ON
TR29
TR30
R90 10K
R97 10K
R96 4.7K
R92 47(1W)
R93 47(1W)
R94 47(1W)
R39 1K
R40 1K
TP1
TP2
TP3
TP4
TR1
TR2
TR3
TR4
TR5
TR6
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR14
TR15
TR16
TR17
TR18
TR19
TR20
TR21
TR22
TR23
TR24
TR25
TR27
TR28
TR31
IC1
D1
D2
D3
D4
L1 47μH
L2 10μH
L3 47μH
VR1 BURST GAIN
VR2 SYNC GAIN
VR3 SUPER LEVEL CONTROL
VR4 SETUP LEVEL
VR5 DG/DP ADJ
VR6 WHITE CLIP LEVEL
VR7 PROGRAM VIDEO GAIN
VR9 DC BALANCE
C27 FREQ. RESPONCE COMP.
C34 1000μ6.3V
C35 1000μ6.3V
C30 3P
C29 100μ 10V
R89 1.5K
R88 10K
SC
4Vp-p
[TP2] PROGRAM VIDEO IN
1Vp-p
BL
7Vp-p
1Vp-p
3Vp-p
1.2Vp-p
1.5Vp-p
1.5Vp-p
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12

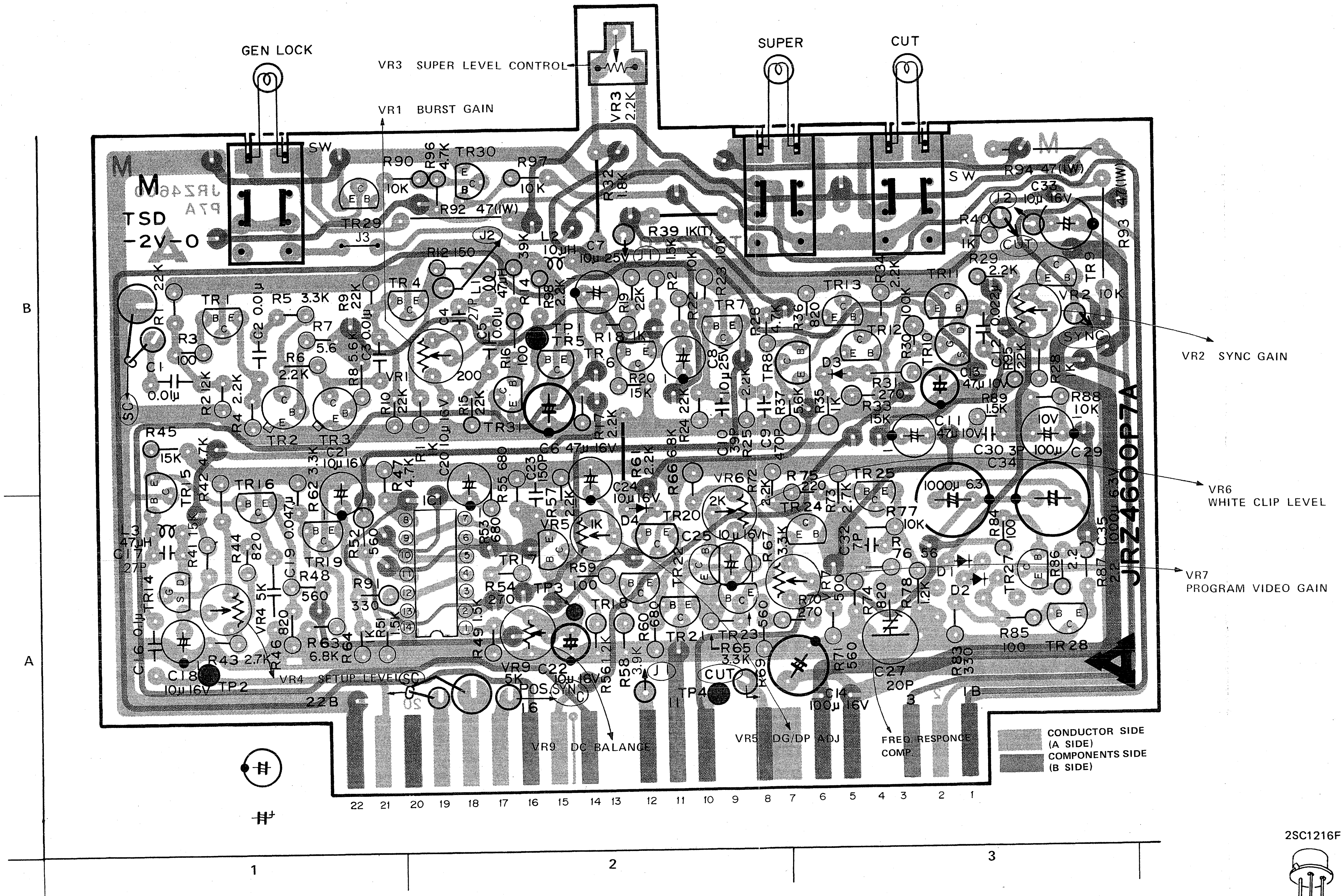
PROGRAM OUTPUT BOARD

IC1	AN904	B5 ~ 6
TR1	2SC828AR	F4
TR2	2SC1216F	E4
TR3	2SC1216F	E5
TR4	2SC828AR	F6
TR5	2SC828AR	E7
TR6	2SA564-RS	E8
TR7	2SC828AR	E9
TR8	2SC828AR	E10
TR9	2SC828AR	E13
TR10	2SK381-C	E12
TR11	2SC828AR	E11
TR12	2SC828AR	E11
TR13	2SA838-BC	E10
TR14	2SK381-C	B3
TR15	2SA1127-TU	B4
TR16	2SC828AR	B4
TR17	2SA564-RS	B6
TR18	2SC1047-CD	B7
TR19	2SC828AR	B8
TR20	2SC1047-CD	B8
TR21	2SA564-RS	B8
TR22	2SA564-AR	B9
TR23	2SC828AR	B9
TR24	2SC1047-CD	B10
TR25	2SC828AR	B11
TR27	2SC1383-PQ	B13
TR28	2SA683-PQ	A13
TR29	2SC1318-RS	H10
TR30	2SC828-AR	
TR31	2SA564-RS	
D1	MA162	B12
D2	MA162	B12
D3	MA162	E11
D4	MA162	B8

Voltages are measured by
SUP switch ——→ ON
GEN-LOCK switch→ON

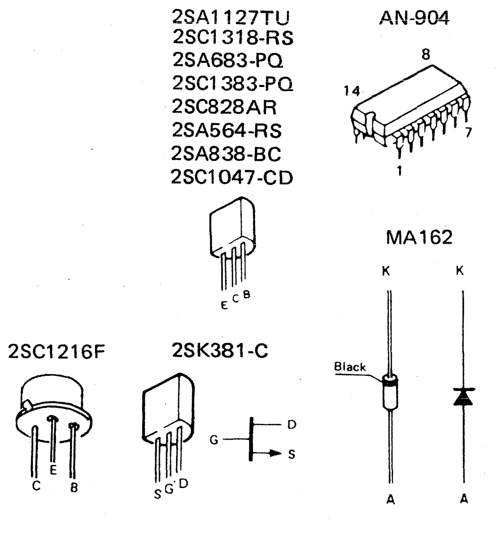
CONDUCTOR VIEW OF PROGRAM OUTPUT BOARD

— Components Side —

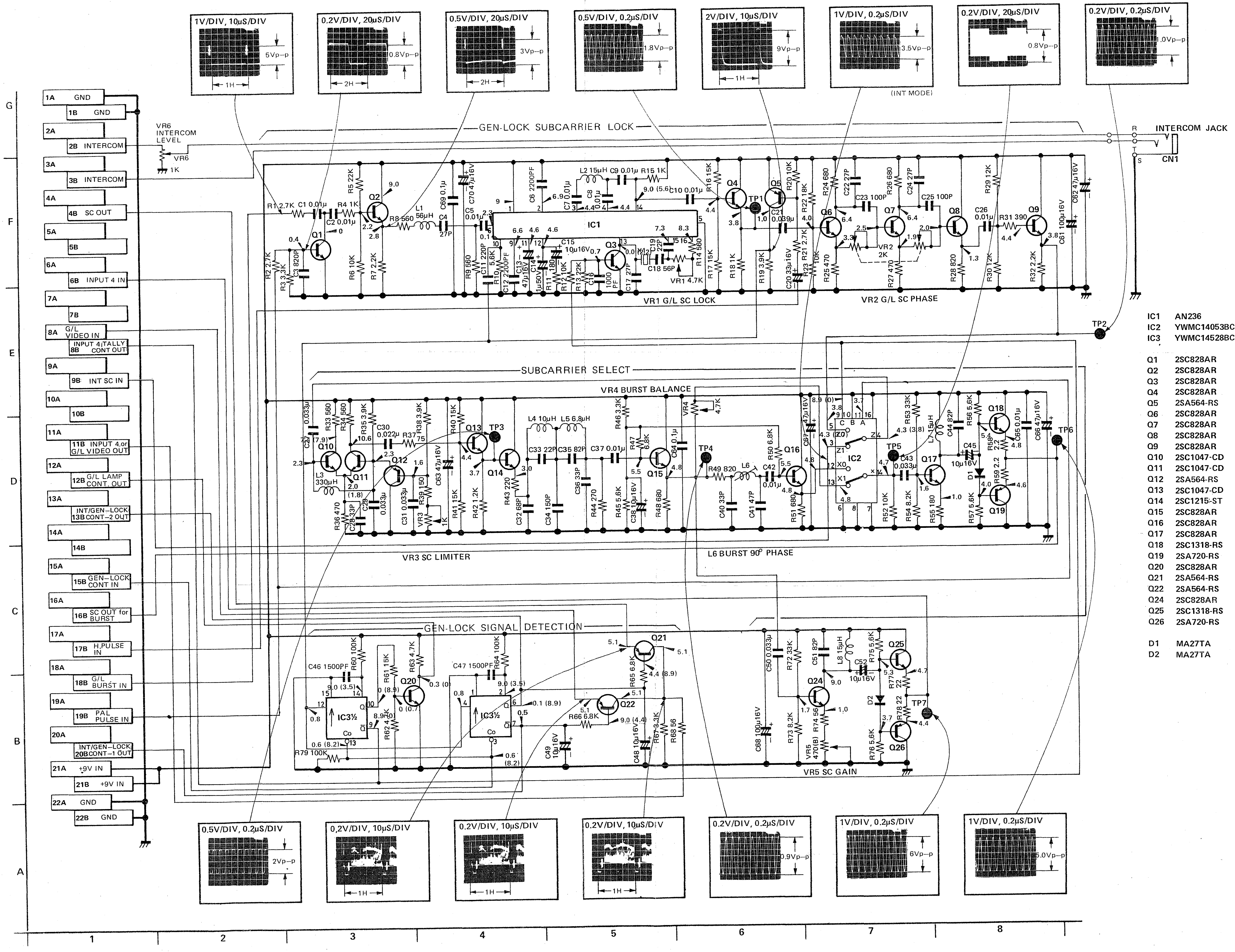

GEN LOCK
VR3 SUPER LEVEL CONTROL
VR1 BURST GAIN
SUPER
CUT
SW
TSD
-2V-0
VR2 SYNC GAIN
VR6
WHITE CLIP LEVEL
VR7
PROGRAM VIDEO GAIN
VR4 SETUP LEVEL
VR9 DC BALANCE
VR5 DG/DP ADJ
FREQ RESPONCE COMP
JRZ4600P7A
CONDUCTOR SIDE (A SIDE)
COMPONENTS SIDE (B SIDE)
22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
A
B
1
2
3

PROGRAM OUTPUT BOARD

IC1	AN-904	A2
TR1	2SC828AR	B1
TR2	2SC1216F	B1
TR3	2SC1216F	B1
TR4	2SC828AR	B1, 2
TR5	2SC828AR	B2
TR6	2SA564-RS	B2
TR7	2SC828AR	B2
TR8	2SC828AR	B3
TR9	2SC828AR	B3
TR10	2SK381-C	B3
TR11	2SC828AR	B3
TR12	2SC828AR	B3
TR13	2SA838-BC	B3
TR14	2SK381-C	A1
TR15	2SA1127-TU	A, B1
TR16	2SC828AR	A1
TR17	2SA564-RS	A2
TR18	2SC1047-CD	A2
TR19	2SC828AR	A1
TR20	2SC1047-CD	A2
TR21	2SA564-RS	A2
TR22	2SA564-RS	A2
TR23	2SC828AR	A2
TR24	2SC1047-CD	A3
TR25	2SC828AR	A3
TR27	2SC1383-PQ	A3
TR28	2SA683-PQ	A3
TR29	2SC1318-RS	B1
TR30	2SC828AR	B2
TR31	2SA564-RS	B2
D1	MA162	A3
D2	MA162	A3
D3	MA162	B3
D4	MA162	A2


2SA1127TU
2SC1318-RS
2SA683-PQ
2SC1383-PQ
2SC828AR
2SA564-RS
2SA838-BC
2SC1047-CD
E C B
AN-904
8
14
7
1
MA162
K
K
Black
A
A
2SC1216F
C E B
2SK381-C
S G D
G
D
S

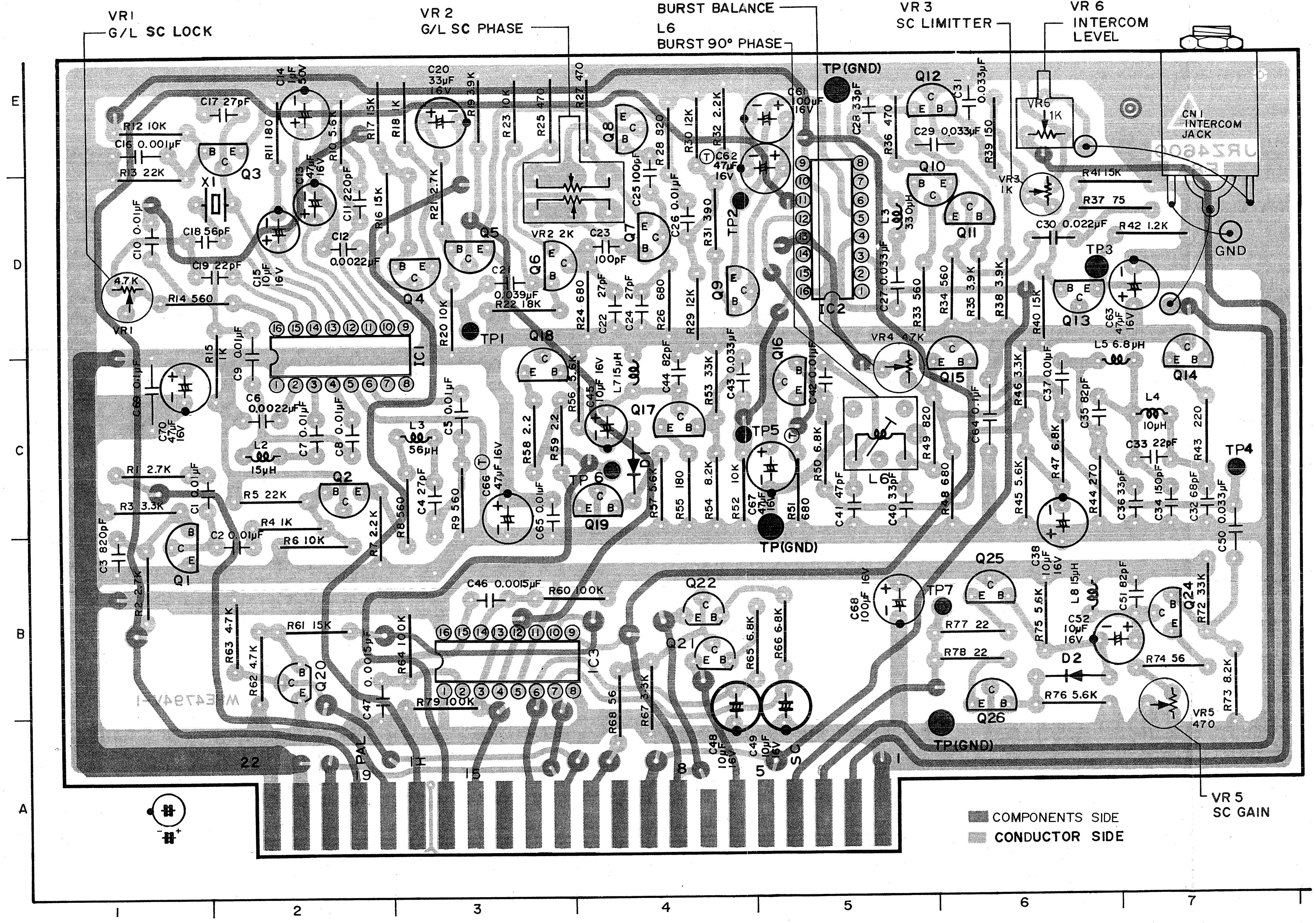
SCHEMATIC DIAGRAM OF SUBCARRIER BOARD


1V/DIV, 10µS/DIV
5Vp–p
1H
0.2V/DIV, 20µS/DIV
0.8Vp–p
2H
0.5V/DIV, 20µS/DIV
3Vp–p
2H
0.5V/DIV, 0.2µS/DIV
1.8Vp–p
2V/DIV, 10µS/DIV
9Vp–p
1H
1V/DIV, 0.2µS/DIV
3.5Vp–p
(INT MODE)
0.2V/DIV, 20µS/DIV
0.8Vp–p
0.2V/DIV, 0.2µS/DIV
1.0Vp–p
1A GND
1B GND
2A
2B INTERCOM
3A
3B INTERCOM
4A
4B SC OUT
5A
5B
6A
6B INPUT 4 IN
7A
7B
8A G/L VIDEO IN
8B INPUT 4/TALLY CONT OUT
9A
9B INT SC IN
10A
10B
11A
11B INPUT 4 or G/L VIDEO OUT
12A
12B G/L LAMP CONT. OUT
13A
13B INT/GEN-LOCK CONT–2 OUT
14A
14B
15A
15B GEN-LOCK CONT IN
16A
16B SC OUT for BURST
17A
17B H.PULSE IN
18A
18B G/L BURST IN
19A
19B PAL PULSE IN
20A
20B INT/GEN-LOCK CONT–1 OUT
21A +9V IN
21B +9V IN
22A GND
22B GND
VR6 INTERCOM LEVEL
VR6 1K
GEN-LOCK SUBCARRIER LOCK
INTERCOM JACK
R
T
S
CN1
IC1
VR1 G/L SC LOCK
VR2 G/L SC PHASE
TP1
TP2
SUBCARRIER SELECT
VR4 BURST BALANCE
TP3
TP4
TP5
TP6
IC2
VR3 SC LIMITER
L6 BURST 90° PHASE
GEN-LOCK SIGNAL DETECTION
IC3½
IC3½
VR5 SC GAIN
TP7
0.5V/DIV, 0.2µS/DIV
2Vp–p
0.2V/DIV, 10µS/DIV
1H
0.2V/DIV, 10µS/DIV
1H
0.2V/DIV, 10µS/DIV
1H
0.2V/DIV, 0.2µS/DIV
0.9Vp–p
1V/DIV, 0.2µS/DIV
6Vp–p
1V/DIV, 0.2µS/DIV
5.0Vp–p
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8

IC1	AN236	F–5
IC2	YWMC14053BCP	D–7
IC3	YWMC14528BCP	B–3, 4
Q1	2SC828AR	F–3
Q2	2SC828AR	F–3
Q3	2SC828AR	F–5
Q4	2SC828AR	F–6
Q5	2SA564-RS	F–6
Q6	2SC828AR	F–7
Q7	2SC828AR	F–7
Q8	2SC828AR	F–8
Q9	2SC828AR	F–8
Q10	2SC1047-CD	D–3
Q11	2SC1047-CD	D–3
Q12	2SA564-RS	D–3
Q13	2SC1047-CD	D–4
Q14	2SC1215-ST	D–4
Q15	2SC828AR	D–5
Q16	2SC828AR	D–6
Q17	2SC828AR	D–7
Q18	2SC1318-RS	D–8
Q19	2SA720-RS	D–8
Q20	2SC828AR	B–3
Q21	2SA564-RS	B–5
Q22	2SA564-RS	C–5
Q24	2SC828AR	B–7
Q25	2SC1318-RS	B–7
Q26	2SA720-RS	C–7
D1	MA27TA	D–8
D2	MA27TA	B–7

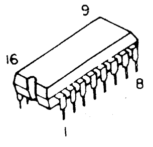
CONDUCTOR VIEW OF SUBCARRIER BOARD

— Components Side —

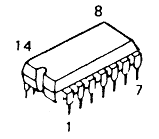

VR1 G/L SC LOCK
VR2 G/L SC PHASE
VR4 BURST BALANCE
L6 BURST 90° PHASE
VR3 SC LIMITTER
VR6 INTERCOM LEVEL
VR5 SC GAIN
CN1 INTERCOM JACK
TP(GND)
TP1
TP2
TP3
TP4
TP5
TP6
TP7
GND
IC1
IC2
IC3
PAL
SC
COMPONENTS SIDE
CONDUCTOR SIDE
E
D
C
B
A
1
2
3
4
5
6
7

IC1	AN236	C2
IC2	YWMC14053BCP	D5
IC3	YWMC14528BCP	B3
Q1	2SC828AR	B1
Q2	2SC828AR	C2
Q3	2SC828AR	E2
Q4	2SC828AR	D3
Q5	2SA564-RS	D3
Q6	2SC828AR	D3
Q7	2SC828AR	D4
Q8	2SC828AR	E4
Q9	2SC828AR	D4
Q10	2SC1047-CD	D5,D6
Q11	2SC1047-CD	D6
Q12	2SA564-RS	E5,E6
Q13	2SC1047-CD	D6
Q14	2SC1215-ST	C7
Q15	2SC828AR	D6
Q16	2SC828AR	C5
Q17	2SC828AR	C4
Q18	2SC1318-RS	C3
Q19	2SA720-RS	C4
Q20	2SC828AR	B2
Q21	2SA564-RS	B4
Q22	2SA564-RS	B4
Q24	2SC828AR	B7
Q25	2SC1318-RS	B6
Q26	2SA720-RS	B6
D1	MA27TA	C4
D2	MA27TA	B6

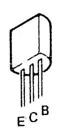
AN236



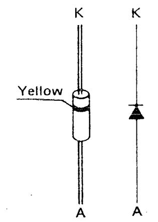
YWMC14053BCP
YWMC14528BCP



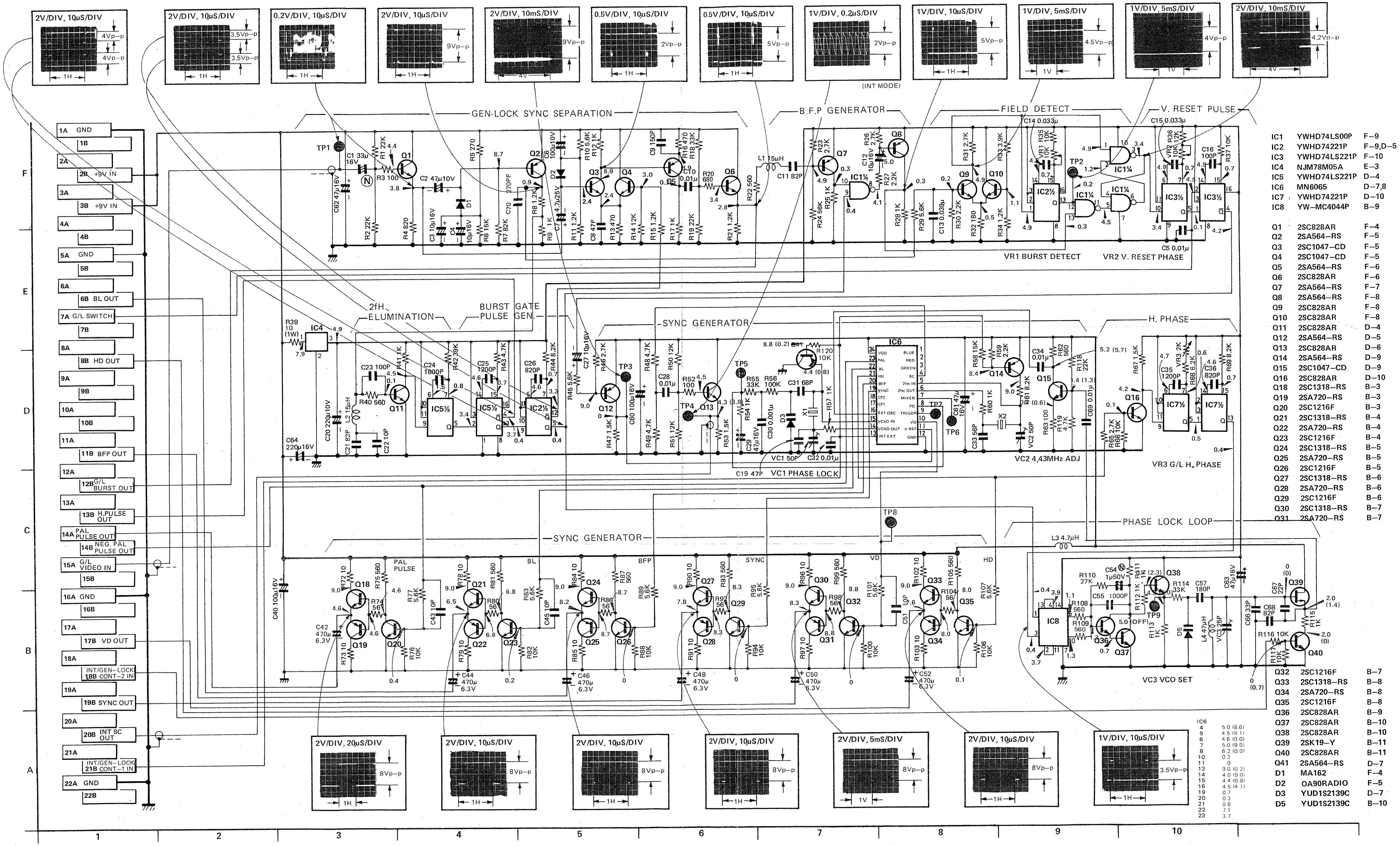
2SC1215ST
2SA720-RS
2SC1318-RS
2SC1047-CD
2SA564-RS
2SC828AR



MA27TA


K
K
Yellow
A
A

SCHEMATIC DIAGRAM OF SYNC GENERATOR BOARD


GEN-LOCK SYNC SEPARATION
B.F.P GENERATOR
FIELD DETECT
V. RESET PULSE
2fH ELUMINATION
BURST GATE PULSE GEN.
SYNC GENERATOR
H. PHASE
PHASE LOCK LOOP
VR1 BURST DETECT
VR2 V. RESET PHASE
VR3 G/L H. PHASE
VC1 PHASE LOCK
VC2 4,43MHz ADJ
VC3 VCO SET
(INT MODE)
1A GND
2B +9V IN
3B +9V IN
5A GND
6B BL OUT
7A G/L SWITCH
8B HD OUT
11B BFP OUT
12B G/L BURST OUT
13B H.PULSE OUT
14A PAL PULSE OUT
14B NEG. PAL PULSE OUT
15A G/L VIDEO IN
16A GND
17B VD OUT
18B INT/GEN-LOCK CONT-2 IN
19B SYNC OUT
20B INT SC OUT
21B INT/GEN-LOCK CONT-1 IN
22A GND
PAL PULSE
BL
BFP
SYNC
VD
HD
2V/DIV, 10µS/DIV
0.2V/DIV, 10µS/DIV
2V/DIV, 10mS/DIV
0.5V/DIV, 10µS/DIV
1V/DIV, 0.2µS/DIV
1V/DIV, 10µS/DIV
1V/DIV, 5mS/DIV
2V/DIV, 20µS/DIV
2V/DIV, 5mS/DIV
1 2 3 4 5 6 7 8 9 10
A B C D E F

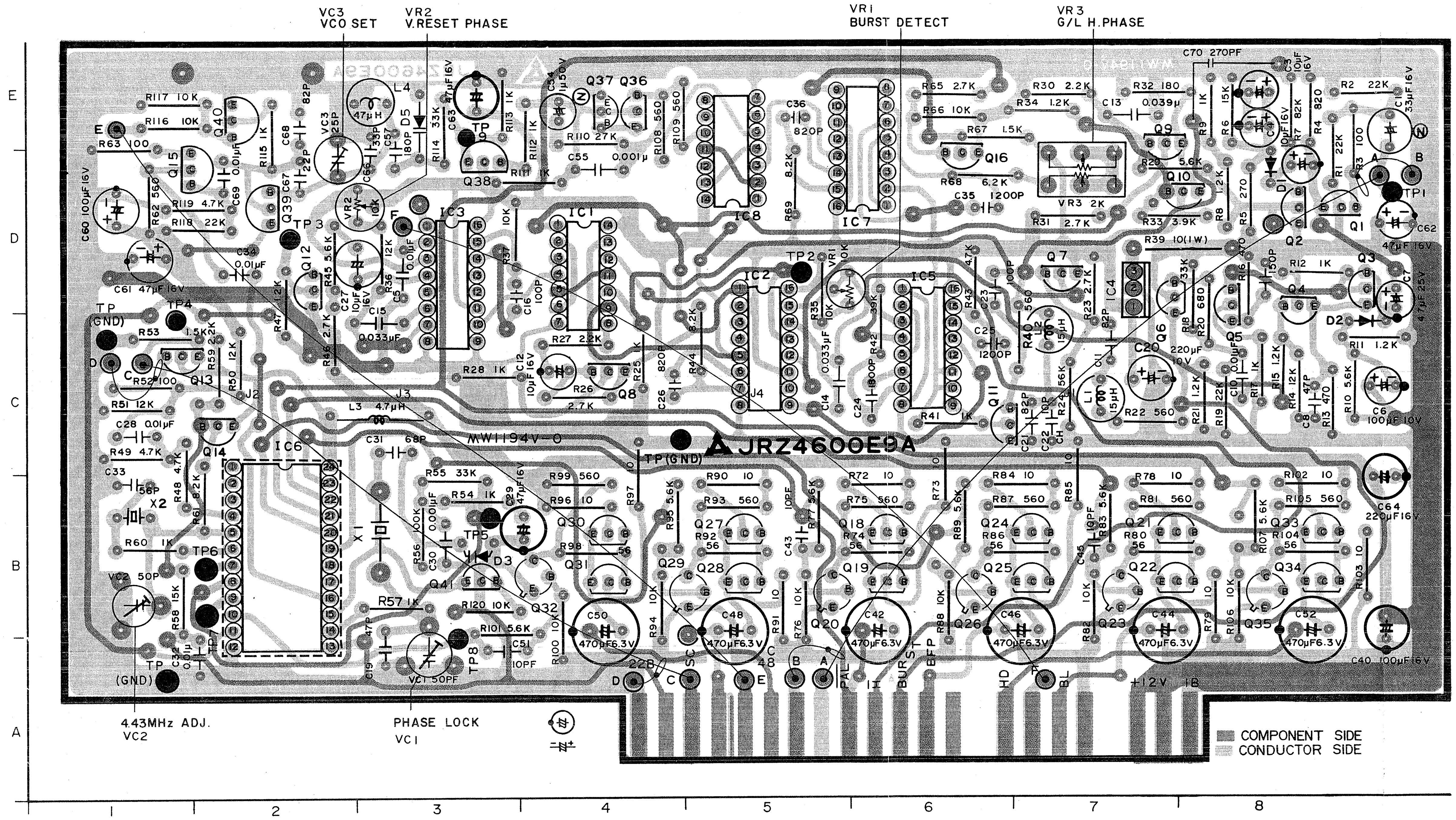
IC1	YWHD74LS00P	F–9
IC2	YWHD74221P	F–9,D–5
IC3	YWHD74LS221P	F–10
IC4	NJM78M05A	E–3
IC5	YWHD74LS221P	D–4
IC6	MN6065	D–7,8
IC7	YWHD74221P	D–10
IC8	YW–MC4044P	B–9
Q1	2SC828AR	F–4
Q2	2SA564–RS	F–5
Q3	2SC1047–CD	F–5
Q4	2SC1047–CD	F–5
Q5	2SA564–RS	F–6
Q6	2SC828AR	F–6
Q7	2SA564–RS	F–7
Q8	2SA564–RS	F–8
Q9	2SC828AR	F–8
Q10	2SC828AR	F–8
Q11	2SC828AR	D–4
Q12	2SA564–RS	D–5
Q13	2SC828AR	D–6
Q14	2SA564–RS	D–9
Q15	2SC1047–CD	D–9
Q16	2SC828AR	D–10
Q18	2SC1318–RS	B–3
Q19	2SA720–RS	B–3
Q20	2SC1216F	B–3
Q21	2SC1318–RS	B–4
Q22	2SA720–RS	B–4
Q23	2SC1216F	B–4
Q24	2SC1318–RS	B–5
Q25	2SA720–RS	B–5
Q26	2SC1216F	B–5
Q27	2SC1318–RS	B–6
Q28	2SA720–RS	B–6
Q29	2SC1216F	B–6
Q30	2SC1318–RS	B–7
Q31	2SA720–RS	B–7
Q32	2SC1216F	B–7
Q33	2SC1318–RS	B–8
Q34	2SA720–RS	B–8
Q35	2SC1216F	B–8
Q36	2SC828AR	B–9
Q37	2SC828AR	B–10
Q38	2SC828AR	B–10
Q39	2SK19–Y	B–11
Q40	2SC828AR	B–11
Q41	2SA564–RS	D–7
D1	MA162	F–4
D2	OA90RADIO	F–5
D3	YUD1S2139C	D–7
D5	YUD1S2139C	B–10

IC6	
4	5.0 (8.6)
5	4.5 (8.1)
6	4.6 (0.0)
7	5.0 (9.0)
8	6.2 (0.0)
10	0.3
11	0
13	9.0 (0.2)
14	4.0 (9.0)
15	4.4 (0.8)
16	4.5 (4.1)
19	0.7
20	0.3
21	0.8
22	7.1
23	3.7

( ) : Voltages are measured at gen-lock mode.

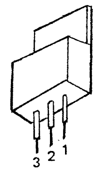
CONDUCTOR VIEW OF SYNC GENERATOR BOARD

— Components Side —


VC3
VCO SET
VR2
V.RESET PHASE
VR1
BURST DETECT
VR3
G/L H.PHASE
4.43MHz ADJ.
VC2
PHASE LOCK
VC1
JRZ4600E9A
MW1194V-0
TP(GND)
+12V
COMPONENT SIDE
CONDUCTOR SIDE
E
D
C
B
A
1
2
3
4
5
6
7
8

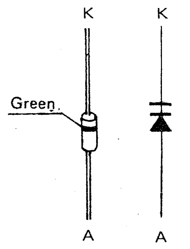
IC1	YWHD74LS00P	C4,D4
IC2	YWHD74221P	C5,D5
IC3	YWHD74LS221P	C3,D3
IC4	NJM78M05A	D7
IC5	YWHD74LS221P	C6,D6
IC6	MN6065	B2
IC7	YWHD74221P	D6,E6
IC8	YW–MC4044P	D5,E5
Q1	2SC828AR	D8
Q2	2SA564–RS	D8
Q3	2SC1047–CD	D8
Q4	2SC1047–CD	C8
Q5	2SA564–RS	C8,D8
Q6	2SC828AR	D7
Q7	2SA564–RS	D7
Q8	2SA564–RS	C4
Q9	2SC828AR	D7,E7
Q10	2SC828AR	D7,D8
Q11	2SC828AR	C6
Q12	2SA564–RS	D2
Q13	2SC828AR	C1,C2
Q14	2SA564–RS	C2
Q15	2SC1047–CD	D1,D2
Q16	2SC828AR	D6
Q18	2SC1318–RS	B6
Q19	2SA720–RS	B6
Q20	2SC1216F	B5
Q21	2SC1318–RS	B7,B8
Q22	2SA720–RS	B7,B8
Q23	2SC1216F	B7
Q24	2SC1318–RS	B7
Q25	2SA720–RS	B7
Q26	2SC1216F	B6
Q27	2SC1318–RS	B5
Q28	2SA720–RS	B5
Q29	2SC1216F	B4,B5
Q30	2SC1318–RS	B4
Q31	2SA720–RS	B4
Q32	2SC1216F	B4
Q33	2SC1318–RS	B8
Q34	2SA720–RS	B8
Q35	2SC1216F	B8
Q36	2SC828AR	E4
Q37	2SC828AR	E4
Q38	2SC828AR	D3
Q39	2SK19–Y	D2
Q40	2SC828AR	E2
Q41	2SA564–RS	B3
D1	MA162	D8
D2	OA90RAD10	C8
D3	YUD1S2139C	B3
D5	YUD1S2139C	E3

NJM78M05A

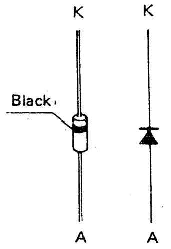


1: Output
2: Ground
3: Input

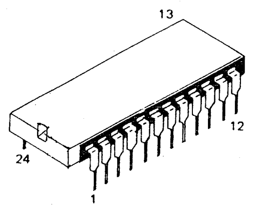
YUD1S2139C



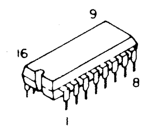
MA162



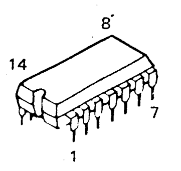
MN6065



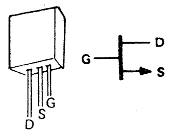
YWHD74221P
YWHD74LS221P



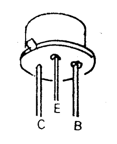
YWMC4044P
YWHD74LS00P



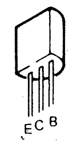
2SK19-Y



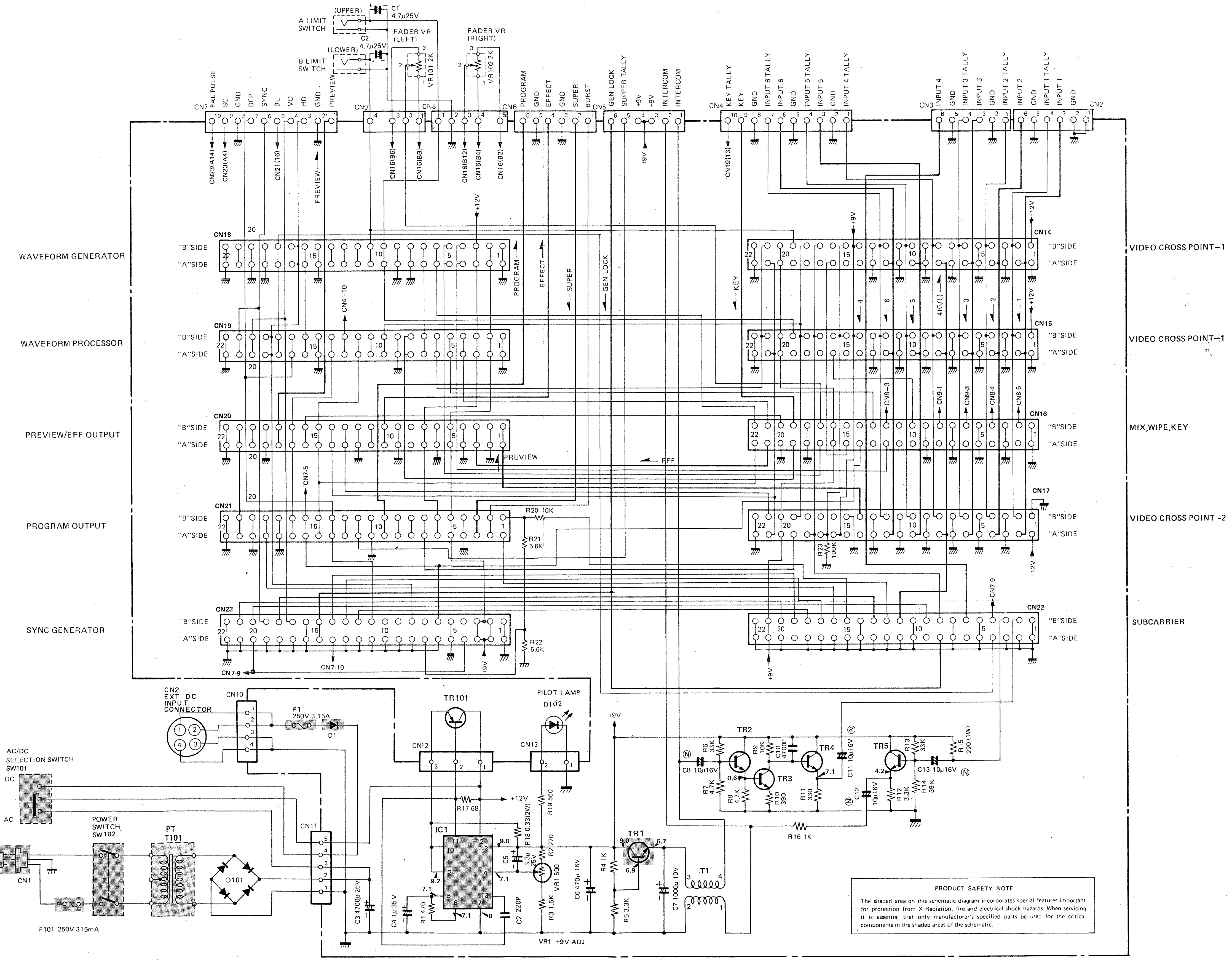
2SC1216F



2SC1318-RS
2SC828RS
2SA564-RS
2SA838-BC
2SC1047-CD
2SA720-RS



SCHEMATIC DIAGRAM OF MOTHER BOARD

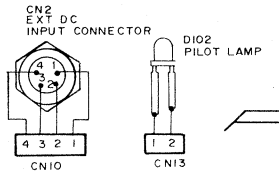

A LIMIT SWITCH
(UPPER)
B LIMIT SWITCH
(LOWER)
C1 4.7μ25V
C2 4.7μ25V
FADER VR (LEFT)
VR101 2K
FADER VR (RIGHT)
VR102 2K
CN7
PAL PULSE
SC
GND
BFP
SYNC
BL
VD
HD
GND
PREVIEW
CN9
CN8
CN6
PROGRAM
GND
EFFECT
GND
SUPER
BURST
CN5
GEN LOCK
SUPPER TALLY
+9V
+9V
INTERCOM
INTERCOM
CN4
KEY TALLY
KEY
GND
INPUT 6 TALLY
INPUT 6
GND
INPUT 5 TALLY
INPUT 5
GND
INPUT 4 TALLY
CN3
INPUT 4
GND
INPUT 3 TALLY
INPUT 3
GND
INPUT 2 TALLY
INPUT 2
GND
INPUT 1 TALLY
INPUT 1
GND
CN2
CN23(A14)
CN23(A4)
CN21(16)
PREVIEW
CN16(B6)
CN16(B8)
CN16(B12)
CN16(B4)
CN16(B2)
+12V
+9V
CN19(13)
WAVEFORM GENERATOR
CN18
"B"SIDE
"A"SIDE
PROGRAM
EFFECT
SUPER
GEN LOCK
KEY
CN14
VIDEO CROSS POINT–1
WAVEFORM PROCESSOR
CN19
CN4-10
4(G/L)
CN15
VIDEO CROSS POINT–1
PREVIEW/EFF OUTPUT
CN20
PREVIEW
EFF
CN8-3
CN9-1
CN9-3
CN8-4
CN8-5
CN16
MIX,WIPE,KEY
PROGRAM OUTPUT
CN21
CN7-5
R20 10K
R21 5.6K
CN17
VIDEO CROSS POINT -2
R23 100K
SYNC GENERATOR
CN23
R22 5.6K
CN7-9
CN7-10
CN22
SUBCARRIER
CN2 EXT DC INPUT CONNECTOR
CN10
F1 250V 3.15A
D1
TR101
PILOT LAMP D102
+9V
AC/DC SELECTION SWITCH SW101
DC
AC
CN12
CN13
TR2
TR4
TR3
TR5
R6 33K
C8 10μ16V
R7 4.7K
R8 4.7K
R9 10K
C10 4700P
R10 390
R11 330
C11 10μ16V
C12 10μ16V
R12 3.3K
R13 33K
R14 39K
R15 220 (1W)
C13 10μ16V
R16 1K
R17 68
R18 0.33(2W)
R19 560
+12V
POWER SWITCH SW102
PT T101
CN11
D101
IC1
C5 3.3μ 25V
R2 270
VR1 500
C6 470μ 16V
R4 1K
R5 3.3K
TR1
T1
C7 1000μ 10V
C3 4700μ 25V
C4 1μ 35V
R1 470
C2 220P
R3 1.5K
VR1 +9V ADJ
220V AC 50Hz
240V AC 50Hz
CN1
F101 250V 315mA

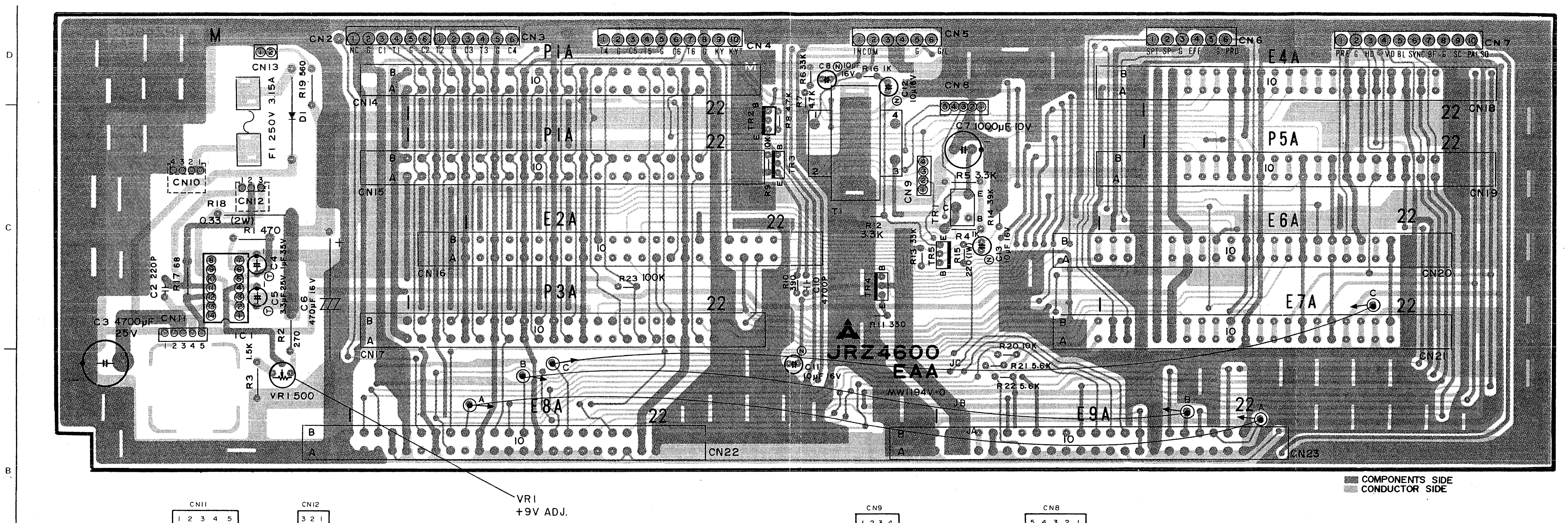
PRODUCT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

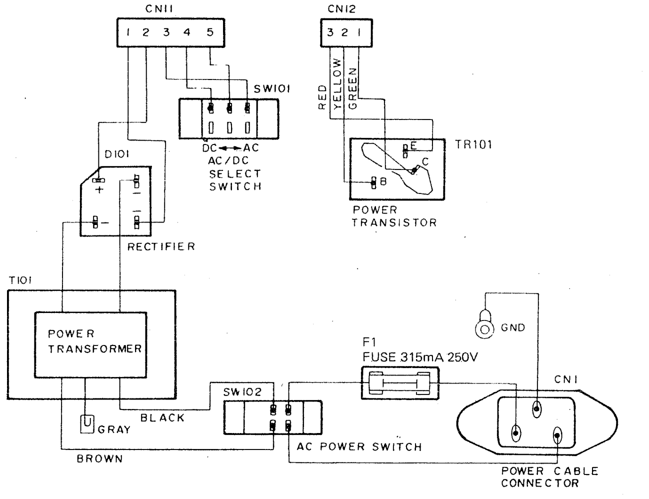
CONDUCTOR VIEW OF MOTHER BOARD

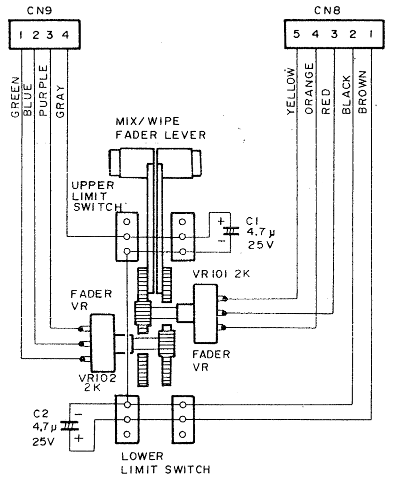
— Components Side —


CN2
EXT DC
INPUT CONNECTOR
D102
PILOT LAMP
4 3 2 1
CN10
1 2
CN13


TO CONNECTOR BOARD
D
C
B
M
CN13
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
CN12
CN14
CN15
CN16
CN17
CN18
CN19
CN20
CN21
CN22
CN23
P1A
E2A
P3A
E4A
P5A
E6A
E7A
E8A
E9A
F1 250V 3.15A
R19 560
D1
R18 0.33 (2W)
R1 470
C2 220P
R17 68
C3 4700μF 25V
C4 33μF 35V
C5 33μF 25V
C6 470μF 16V
IC1
R2 270
R3 1.5K
VR1 500
R23 100K
TR2
R8 4.7K
R9 10K
R6 33K
R7 47K
C8 10μF 16V
R16 1K
C12 10μF 16V
C7 1000μF 10V
R5 3.3K
TR1
R14 39K
R12 3.3K
R13 33K
TR5
R15 220 (1W)
R4 1K
C13 10μF 16V
TR4
TR3
R10 390
C10 4700P
R11 330
C11 10μF 16V
JRZ4600
EAA
MW1194V-0
R20 10K
R21 5.6K
R22 5.6K
JA
JB
JC
T1
VR1
+9V ADJ.

▨ COMPONENTS SIDE
▨ CONDUCTOR SIDE


CN11
1 2 3 4 5
CN12
3 2 1
RED
YELLOW
GREEN
SW101
DC ←→ AC
AC/DC
SELECT
SWITCH
TR101
E
C
B
POWER
TRANSISTOR
D101
RECTIFIER
T101
POWER
TRANSFORMER
GRAY
BROWN
BLACK
SW102
AC POWER SWITCH
F1
FUSE 315mA 250V
GND
CN1
POWER CABLE
CONNECTOR

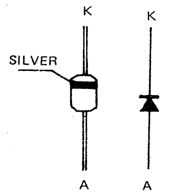

CN9
1 2 3 4
GREEN
BLUE
PURPLE
GRAY
CN8
5 4 3 2 1
YELLOW
ORANGE
RED
BLACK
BROWN
MIX/WIPE
FADER LEVER
UPPER
LIMIT
SWITCH
C1
4.7μ
25V
VR101 2K
FADER
VR
FADER
VR
VR102
2K
C2
4.7μ
25V
LOWER
LIMIT SWITCH

1
2
3
4
5
6
7

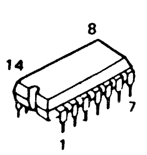
MOTHER BOARD

IC1	HA17723G	C1
TR1	2SC1226A-PTR	C4
TR2	2SD636-RS	C4
TR3	2SD636-RS	C4
TR4	2SD636-RS	C4
TR5	2SD636-RS	C4
D1	ERC81-004	C, D2

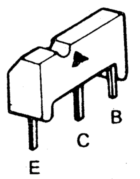
ERC81-004


K
K
SILVER
A
A

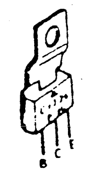
HA17723G



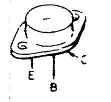
2SD636-RS



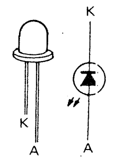
2SC1226-PTR



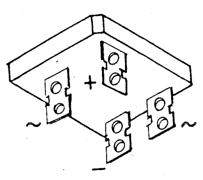
2SA837-PQ



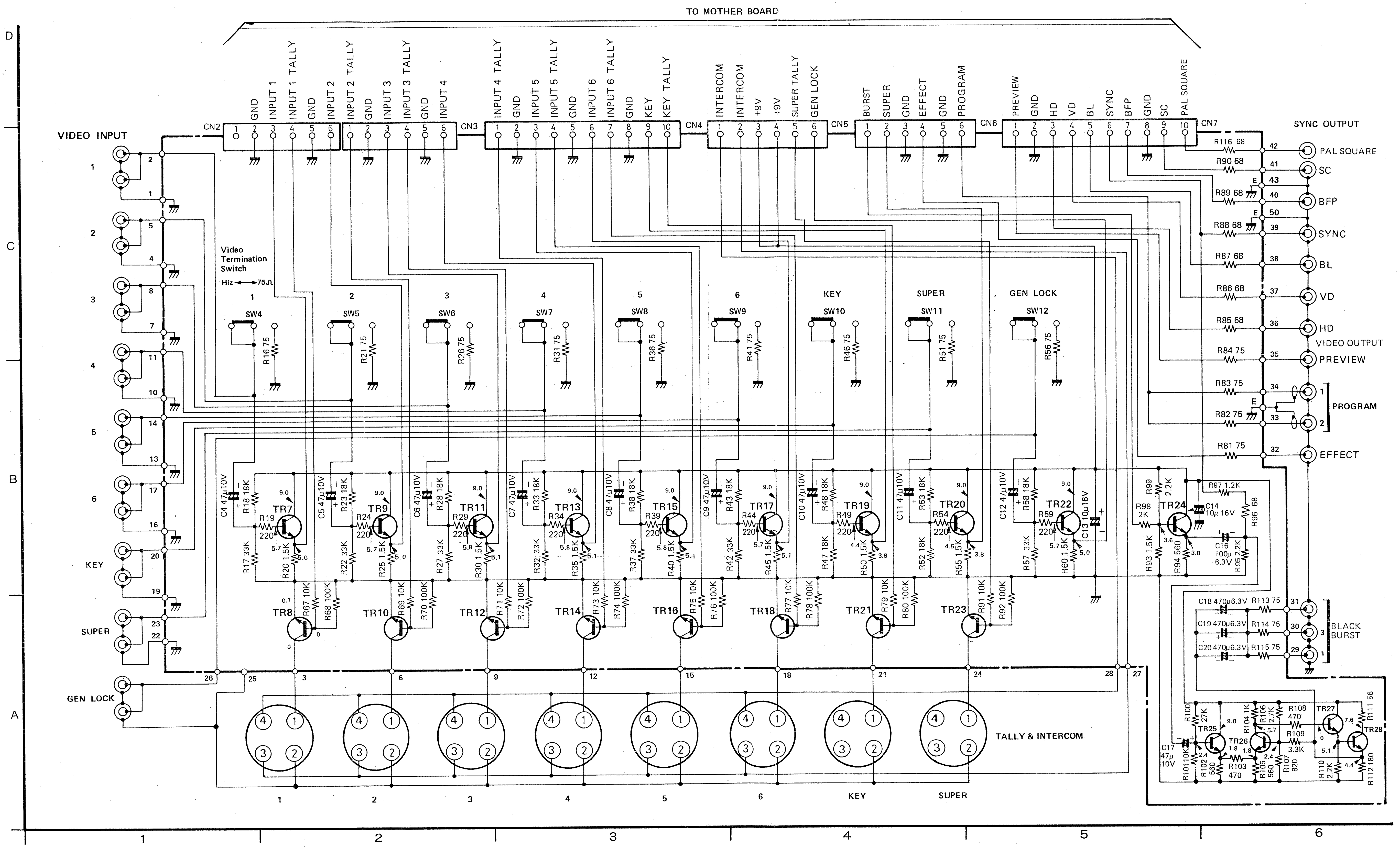
LN21RPH



S10VB20



SCHEMATIC DIAGRAM OF CONNECTION BOARD

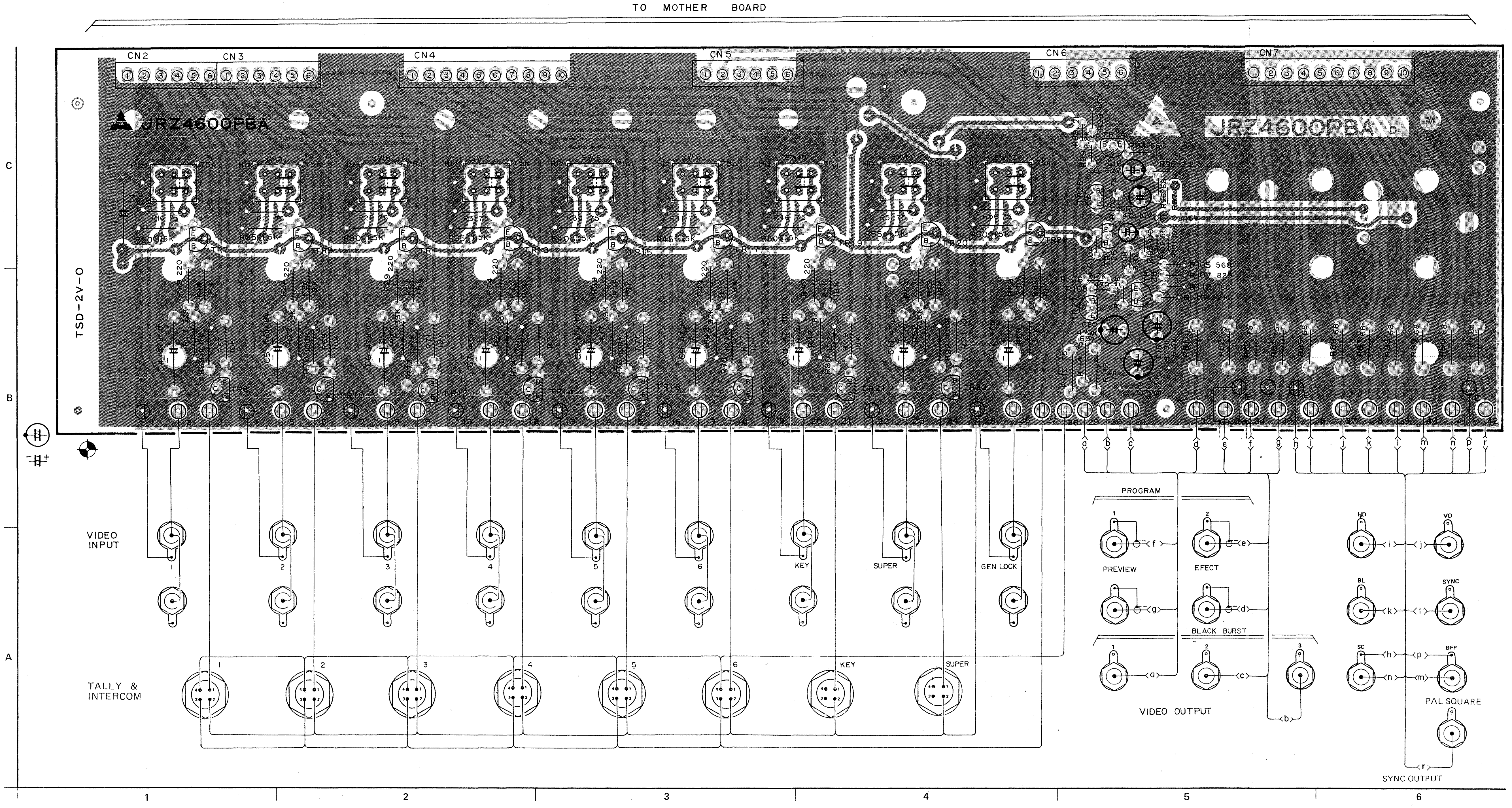

TO MOTHER BOARD
CN2
GND
INPUT 1
INPUT 1 TALLY
GND
INPUT 2
CN3
INPUT 2 TALLY
GND
INPUT 3
INPUT 3 TALLY
GND
INPUT 4
INPUT 4 TALLY
GND
INPUT 5
INPUT 5 TALLY
GND
INPUT 6
INPUT 6 TALLY
GND
KEY
KEY TALLY
CN4
INTERCOM
INTERCOM
+9V
+9V
SUPER TALLY
GEN LOCK
CN5
BURST
SUPER
GND
EFFECT
GND
PROGRAM
CN6
PREVIEW
GND
HD
VD
BL
SYNC
BFP
GND
SC
PAL SQUARE
CN7
VIDEO INPUT
1
2
3
4
5
6
KEY
SUPER
GEN LOCK
Video Termination Switch
Hiz ←→ 75Ω
SW4
SW5
SW6
SW7
SW8
SW9
SW10
SW11
SW12
KEY
SUPER
GEN LOCK
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR14
TR15
TR16
TR17
TR18
TR19
TR20
TR21
TR22
TR23
TR24
TR25
TR26
TR27
TR28
SYNC OUTPUT
PAL SQUARE
SC
BFP
SYNC
BL
VD
HD
VIDEO OUTPUT
PREVIEW
PROGRAM
EFFECT
BLACK BURST
TALLY & INTERCOM
D
C
B
A
1
2
3
4
5
6

CONNECTION BOARD

TR7	2SC828AR	B2
TR8	2SC1318-RS	A2
TR9	2SC828AR	B2
TR10	2SC1318-RS	A2
TR11	2SC828AR	B2
TR12	2SC1318-RS	A2, 3
TR13	2SC828AR	B3
TR14	2SC1318-RS	A3
TR15	2SC828AR	B3
TR16	2SC1318-RS	A3
TR17	2SC828AR	B4
TR18	2SC1318-RS	A4
TR19	2SC828AR	B4
TR20	2SC828AR	B4, 5
TR21	2SC1318-RS	A4
TR22	2SC828AR	B5
TR23	2SC1318-RS	A5
TR24	2SC1318-RS	B5
TR25	2SC828AR	A6
TR26	2SC828AR	A6
TR27	2SC828AR	A6
TR28	2SC1318-RS	A6

CONDUCTOR VIEW OF CONNECTION BOARD

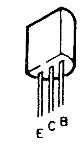
— Components Side —


TO MOTHER BOARD
CN2
CN3
CN4
CN5
CN6
CN7
JRZ4600PBA
TSD-2V-0
TR7
TR8
TR9
TR10
TR11
TR12
TR13
TR14
TR15
TR16
TR17
TR18
TR19
TR20
TR21
TR22
TR23
TR24
VIDEO INPUT
1
2
3
4
5
6
KEY
SUPER
GEN LOCK
TALLY & INTERCOM
PROGRAM
PREVIEW
EFECT
BLACK BURST
VIDEO OUTPUT
HD
VD
BL
SYNC
SC
BFP
PAL SQUARE
SYNC OUTPUT
C
B
A

CONNECTION BOARD

TR7	2SC828AR	C1
TR8	2SC1318-RS	B1
TR9	2SC828AR	C2
TR10	2SC1318-RS	B2
TR11	2SC828AR	C2
TR12	2SC1318-RS	B2
TR13	2SC828AR	C2
TR14	2SC1318-RS	B2
TR15	2SC828AR	C3
TR16	2SC1318-RS	B3
TR17	2SC828AR	C3
TR18	2SC1318-RS	B3
TR19	2SC828AR	C4
TR20	2SC828AR	C4
TR21	2SC1318-RS	B4
TR22	2SC828AR	C4
TR23	2SC1318-RS	B4
TR24	2SC1318-RS	C5
TR25	2SC828AR	C5
TR26	2SC828AR	C5
TR27	2SC828AR	B5
TR28	2SC1318-RS	B5

2SC828AR
2SC1318-RS



Service Manual

Special Effects Generator
WJ-4600

Vol. 4

Replacement Parts List
Exploded View

CONTENTS

PARTS LIST

Miscellaneous 1
Video Crosspoint-1 Board 1
Wipe/Mix/Key Board . . . . 2~3
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Important Notice

REPLACEMENT PARTS LIST

1. Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
2. Components identified by ○ mark are new parts used from this model.
3. Complete printed circuit board assembly is not available as replacement part.

MISCELLANEOUS

SYMBOL NO.	PART NO.	DESCRIPTION
TR101	2SA837-PQ	Power Transistor
D101	S10VB20	Diode
D102	LN21	LED
VR101,102	EVSY2AS20B23	Variable Resistor 2K ohms
C1,2	ECEB1ES4R7	Electrolytic 4.7 μF 25V
T101 ⚠	YFPHE76V022	Power Transformer
SW101 ⚠	ESD391T	AC/DC Selection Switch
SW102 ⚠	EST1554	Power Switch
SW103-106	YWMSS-5-2	Micro Switch
F1 ⚠	XBA2C31ET0A	Current Fuse 3.15A 250V
F101 ⚠	XBA2C031ET0A	Current Fuse 3.5mA 250V
CN1 ⚠	YFCM3	Power Cable Connector
CN2	YWRM12BRD-4P	EXT DC INPUT Connector
CN3	YWS2-104W1S0	Transistor Socket
CN4-11	YFCNR-1204J	Tally Intercom Connector
CN12-43	YWBNC-R	BNC Connector
CN103	○ YF418-4132M	AC Power Cord for WJ-4600/A
	○ YFBS-1132M	AC Power Cord for WJ-4600/B
	○ YF99F-1132M	AC Power Cord for WJ-4600/C
	○ YF99-1132M	AC Power Cord for WJ-4600/G
E1 ⚠	YWX-N1153-07	Fuse Holder
E105	YWMSF1000-4A	Wipe Mix Lever Assembly
M1	YWFL-BUTTON	Switch Button
M2	○ YFV5WC0185A2	Front Decoration Panel
M3	○ YFV6GA0024A2	Decide Position Sheet
M4	○ YFV5EA0257A3	Right Side Cover
M5	○ YFV5EA0254A3	Left Side Cover
M6	○ YFV5EA0255A2	Bottom Cover
M7	YWJ5500KM01A	Upper Cover
M8	YWJ4600CM04	Mounting Angle D for Fader
M9	○ YFV5WB0186A2	Rear Panel
M10	YFV2SA0149A4	Mounting Angle E for Power Supply
M11	YVSQ0170AM2A	Heat Sink
M12	○ YFV5EA0256A4	Heat Sinc Cover
M13	YWJ4600AM03A	Mounting Angle for Jack
M14	YWJ4600AM05A	Mounting Angle A for Side Cover
M15	YWJ4600AM06	Mounting Angle B for Right Side Mother board
M16	YWJ4600AM07	Mounting Angle C for Left Side Mother board
M17	○ YFV2SA0148A4	Mounting Angle G for Connection Board
M18	YWV8250AM20	Rack Bracket (x2)
M19	YWB350HM01	Rack Handle (x2)
M20	YWJ800PWB01	Rubber Bushing for LED
M21	YWUM50-HM01B	14 Knob
M23 ⚠	YFV7QA0703A4	Main Label
M24 ⚠	YFV2PA0069A4	Insulator Sheet for Fuse Holder
M25 ⚠	YFV7MA0142A4	Fuse Rated Label
M26 ⚠	YFV7MB0099A4	UL Safety Label
M28	YFV2SA0161A4	Moutning Angle F for Front Panel
M30 ⚠	YFV7MA0125A4	DC12V Caution Label
M31	YWL3X6BER01	Insulator Washer (x4)
M32	YFV7SA0217A4	Expression Card A for Switch
M34	YWJ5500UR02	Expression Card B for Switch
M36	YWJ5500AM03	Mounting Angle G
M48 ⚠	YW-BCG-UR01B	Earth Label
M49	YWA620AER01	Insulator Washer (x2)
M50	YW-BCG-EM01	Earth Lag.

VIDEO CROSSPOINT-1 BOARD

SYMBOL NO.	PART NO.	DESCRIPTION
PCB1	YFJKZ4600P1A	Printed Circuit Board Assy
IC1,2	YWMC14081BCP	IC
IC3	YWMC14174BCP	IC
IC4	YWMC14081BCP	IC
TR1-12	2SC828AR	Transistor
TR14	2SC828AR	Transistor
TR15-21	2SC1318-RS	Transistor
D1-13	MA162	Diode
R1	ERD25TJ103	Carbon 10K ohms 1/4W
R2	ERD25FJ221	Carbon 220 ohms 1/4W
R3	ERD25FJ103	Carbon 10K ohms 1/4W
R4	ERD25FJ221	Carbon 220 ohms 1/4W
R5	ERD25FJ103	Carbon 10K ohms 1/4W
R6	ERD25FJ221	Carbon 220 ohms 1/4W
R7	ERD25FJ103	Carbon 10K ohms 1/4W
R8	ERD25FJ681	Carbon 680 ohms 1/4W
R9	ERD25FJ103	Carbon 10K ohms 1/4W
R10	ERD25FJ681	Carbon 680 ohms 1/4W
R11	ERD25FJ103	Carbon 10K ohms 1/4W
R12	ERD25FJ221	Carbon 220 ohms 1/4W
R13	ERD25FJ102	Carbon 1K ohms 1/4W
R16,17	ERD25FJ563	Carbon 56K ohms 1/4W
R19	ERD25FJ564	Carbon 560K ohms 1/4W
R20	ERD25FJ472	Carbon 4.7K ohms 1/4W
R21	ERD25FJ103	Carbon 10K ohms 1/4W
R22	ERD25FJ563	Carbon 56K ohms 1W
R23	ERD25FJ102	Carbon 1K ohms 1/4W
R24-36	ERD25FJ103	Carbon 10K ohms 1/4W
R37	ERD50FJ181	Carbon 180 ohms 1/2W
R38	ERD25FJ103	Carbon 10K ohms 1/4W
R39	ERG1ANJ470	Metal 47 ohms 1W
C1	ECEA1ES4R7	Electrolytic 4.7 μF 25V
C2	ECEA1CS101	Electrolytic 100 μF 16V
SW1	YW6FL2EC0421	Input Selector Switch
E10	WMT4X1R2X5	Insulator
M22	YWJ5500FR02B	Mounting Angle for Switch (x2)

WIPE/MIX/KEY BOARD

SYMBOL NO.	PART NO.	DESCRIPTION	
PCB2	° YFJKZ4600E2A	Printed Circuit Board Assy	
IC1-3	AN-904	IC	
TR1	2SK381-C	Transistor	
TR2	2SK19-Y	Transistor	
TR3	2SC828AR	Transistor	
TR4	2SA564-RS	Transistor	
TR5	2SC828AR	Transistor	
TR6	2SA838-BC	Transistor	
TR7	2SC828AR	Transistor	
TR8	2SK381-C	Transistor	
TR9	2SK19-Y	Transistor	
TR10	2SC828AR	Transistor	
TR11	2SA838-BC	Transistor	
TR12	2SC828AR	Transistor	
TR13	2SA564-RS	Transistor	
TR14	2SC828AR	Transistor	
TR15	2SC1047-CD	Transistor	
TR16	2SA838-BC	Transistor	
TR17	2SK381-C	Transistor	
TR18	2SK19-Y	Transistor	
TR19-21	2SC828AR	Transistor	
TR22	2SA564-RS	Transistor	
TR23	2SK381-C	Transistor	
TR24,25	2SC1047-CD	Transistor	
TR26-29	2SC828AR	Transistor	
TR30	2SA564-RS	Transistor	
TR31,32	2SC828AR	Transistor	
TR33,34	2SA564-RS	Transistor	
TR35-38	2SC828AR	Transistor	
D1-4	MA162	Diode	
R1	ERD25FJ104	Carbon	100K ohms 1/4W
R2	ERD25FJ222	Carbon	2.2K ohms 1/4W
R3	ERD25FJ821	Carbon	820 ohms 1/4W
R4	ERD25FJ561	Carbon	560 ohms 1/4W
R5	ERD25FJ152	Carbon	1.5K ohms 1/4W
R6	ERD25FJ122	Carbon	1.2K ohms 1/4W
R7	ERD25FJ561	Carbon	560 ohms 1/4W
R8,9	ERD25FJ271	Carbon	270 ohms 1/4W
R10	ERD25FJ122	Carbon	1.2K ohms 1/4W
R11	ERD25FJ271	Carbon	270 ohms 1/4W
R12	ERD25FJ102	Carbon	1K ohms 1/4W
R13,15	ERD25FJ101	Carbon	100 ohms 1/4W
R16	ERD25FJ102	Carbon	1K ohms 1/4W
R18	ERD25FJ331	Carbon	330 ohms 1/4W
R19	ERD25FJ152	Carbon	1.5K ohms 1/4W
R21,22	ERD25FJ271	Carbon	270 ohms 1/4W
R23	ERD25FJ152	Carbon	1.5K ohms 1/4W
R24	ERD25FJ821	Carbon	820 ohms 1/4W
R25	ERD25FJ101	Carbon	100 ohms 1/4W
R26	ERD25FJ152	Carbon	1.5K ohms 1/4W
R28	ERD25FJ122	Carbon	1.2K ohms 1/4W
R29	ERD25FJ562	Carbon	5.6K ohms 1/4W
R30	ERD25FJ561	Carbon	560 ohms 1/4W
R31	ERD25FJ104	Carbon	100K ohms 1/4W
R32	ERD25FJ222	Carbon	2.2K ohms 1/4W
R33-35	ERD25FJ102	Carbon	1K ohms 1/4W
R36	ERD25FJ222	Carbon	2.2K ohms 1/4W
R37	ERD25FJ821	Carbon	820 ohms 1/4W
R39	ERD25FJ102	Carbon	1K ohms 1/4W
R40	ERD25FJ122	Carbon	1.2K ohms 1/4W
R41	ERD25FJ561	Carbon	560 ohms 1/4W
R42	ERD25FJ271	Carbon	270 ohms 1/4W
R43	ERD25FJ152	Carbon	1.5K ohms 1/4W
R44	ERD25FJ122	Carbon	1.2K ohms 1/4W
R45	ERD25FJ271	Carbon	270 ohms 1/4W
R46	ERD25FJ122	Carbon	1.2K ohms 1/4W
R47	ERD25FJ182	Carbon	1.8K ohms 1/4W
R48	ERD25FJ392	Carbon	3.9K ohms 1/4W
R49	ERD25FJ822	Carbon	8.2K ohms 1/4W
R50	ERD25FJ821	Carbon	820 ohms 1/4W
R51	ERD25FJ102	Carbon	1K ohms 1/4W
R52	ERD25FJ101	Carbon	100 ohms 1/4W
R55	ERD25FJ102	Carbon	1K ohms 1/4W
R57,58	ERD25FJ222	Carbon	2.2K ohms 1/4W
R59	ERD25FJ182	Carbon	1.8K ohms 1/4W
R60	ERD25FJ104	Carbon	100K ohms 1/4W
R61	ERD25FJ222	Carbon	2.2K ohms 1/4W
R62	ERD25FJ821	Carbon	820 ohms 1/4W
R63	ERD25FJ221	Carbon	220 ohms 1/4W
R64	ERD25FJ152	Carbon	1.5K ohms 1/4W
R65	ERD25FJ103	Carbon	10K ohms 1/4W
R66	ERD25FJ222	Carbon	2.2K ohms 1/4W
R67	ERD25FJ104	Carbon	100K ohms 1/4W
R68	ERD25FJ152	Carbon	1.5K ohms 1/4W
R69	ERD25FJ153	Carbon	15K ohms 1/4W
R70	ERD25FJ332	Carbon	3.3K ohms 1/4W
R71	ERD25FJ471	Carbon	470 ohms 1/4W
R72	ERD25FJ102	Carbon	1K ohms 1/4W
R73	ERD25FJ103	Carbon	10K ohms 1/4W
R74	ERD25FJ222	Carbon	2.2K ohms 1/4W
R75	ERD25FJ153	Carbon	15K ohms 1/4W
R76	ERD25FJ562	Carbon	5.6K ohms 1/4W
R77-79	ERD25FJ222	Carbon	2.2K ohms 1/4W
R80,81	ERD25FJ152	Carbon	1.5K ohms 1/4W
R82	ERD25FJ222	Carbon	2.2K ohms 1/4W
R83,84	ERD25FJ681	Carbon	680 ohms 1/4W
R85	ERD25FJ471	Carbon	470 ohms 1/4W
R86	ERD25FJ222	Carbon	2.2K ohms 1/4W
R87,90	ERD25FJ102	Carbon	1K ohms 1/4W
R92	ERD25FJ222	Carbon	2.2K ohms 1/4W
R93	ERD25FJ222	Carbon	2.2K ohms 1/4W
R94	ERD25FJ682	Carbon	6.8K ohms 1/4W
R95	ERD25FJ331	Carbon	330 ohms 1/4W
VR1	YWSR19R1KB	Variable Resistor	1K ohms
VR2	YWSR19R470B	Variable Resistor	470 ohms
VR3	YWSR29R1KB	Variable Resistor	1K ohms
VR4	YWSR19R1KB	Variable Resistor	1K ohms
VR5	YWSR29R470B	Variable Resistor	470 ohms
VR6	YFH0622A680	Variable Resistor	680 ohms
VR7	YWSR19R1KB	Variable Resistor	1K ohms
VR8	YWSR19R470B	Variable Resistor	470 ohms

SYMBOL NO.	PART NO.	DESCRIPTION	
VR9	YWSR29R470B	Variable Resistor	470 ohms
VR10,11	YWSR19R470B	Variable Resistor	470 ohms
VR12-15	YWSR19R2.2KB	Variable Resistor	2.2K ohms
VR16	YCVRJ6PK502B	Variable Resistor	5K ohms
VR17	YCVRJ6PK103B	Variable Resistor	10K ohms
VR18	YCVRJ6PK203B	Variable Resistor	20K ohms
C1	ECTRP1472JZ	Plastic	4700 pF 100V
C2	ECCF1H270JC	Ceramic	27pF 50V
C3	ECEA1CSS100	Electrolytic	10 µF 16V
C4	ECEA1CS470	Electrolytic	47 µF 16V
C6-8	ECEA1CSS100	Electrolytic	10 µF 16V
C9	ECCF1H680JC	Ceramic	68 pF 50V
C10	ECEA1CN330S	Electrolytic	33 µF 16V
C11-13	ECEA1CSS100	Electrolytic	10 µF 16V
C14	ECTRM1H223KZ	Plastic	0.022 µF 50V
C15	ECCF1H270JC	Ceramic	27 pF 50V
C16-20	ECEA1CSS100	Electrolytic	10 µF 16V
C21	ECEA1AS470	Electrolytic	47 µF 10V
C22	ECCF1H680JC	Ceramic	68 pF 50V
C23	ECTRM1H223KZ	Plastic	0.022 µF 50V
C24	ECEA1CSS100	Electrolytic	10 µF 16V
C25	ECCF1H270JC	Ceramic	27 pF 50V
C26	ECEA1AS101	Electrolytic	100 µF 10V
C27	ECEA1CS470	Electrolytic	47 µF 16V
C28	ECTRM1H473KZ	Plastic	0.047 µF 50V
C29	ECEA1AS101	Electrolytic	100 µF 10V
C30	ECEA1CS101	Electrolytic	100 µF 16V
C31,32	ECEA1ES4R7	Electrolytic	4.7 µF 25V
C33,34	ECEA1CSS100	Electrolytic	10 µF 16V
C35	ECEA1ES100	Electrolytic	10 µF 25V
C36	ECCF1H151JR	Ceramic	150 pF 50V
C37	ECKF1H471KB	Ceramic	470 pF 50V
C38	ECKF1H271KB	Ceramic	270 pF 50V
C39	ECKF1H473ZF	Ceramic	0.047 µF 50V
C40	ECEA1CSS100	Electrolytic	10 µF 16V
L1-3	YSP0406L470K	Coil	47 µH

VIDEO CROSSPOINT-2 BOARD

SYMBOL NO.	PART NO.	DESCRIPTION	
PCB3	○YFJKZ4600P3A	Printed Circuit Board Assy	
IC1	YWMC14174BCP	IC	
IC2	YWMC14081BCP	IC	
IC3	YWMC14073BCP	IC	
IC4	YWMC14013BCP	IC	
IC5	MN4011B	IC	
TR1-15	2SC828AR	Transistor	
TR16-23	2SC1318-RS	Transistor	
D1-13	MA162	Diode	
R1	ERD25FJ103	Carbon	10K ohms 1/4W
R2	ERD25FJ221	Carbon	220 ohms 1/4W
R3	ERD25FJ103	Carbon	10K ohms 1/4W
R4	ERD25FJ221	Carbon	220 ohms 1/4W
R5	ERD25FJ103	Carbon	10K ohms 1/4W
R6	ERD25FJ221	Carbon	220 ohms 1/4W
R7	ERD25FJ103	Carbon	10K ohms 1/4W
R8	ERD25FJ221	Carbon	220 ohms 1/4W
R9	ERD25FJ103	Carbon	10K ohms 1/4W
R10	ERD25FJ221	Carbon	220 ohms 1/4W
R11	ERD25FJ103	Carbon	10K ohms 1/4W
R12	ERD25FJ221	Carbon	220 ohms 1/4W
R13	ERD25FJ102	Carbon	1K ohms 1/4W
R14	ERD25FJ221	Carbon	220 ohms 1/4W
R15	ERD25FJ102	Carbon	1K ohms 1/4W
R16,17	ERD25FJ153	Carbon	15K ohms 1/4W
R18	ERD25FJ562	Carbon	5.6K ohms 1/4W
R19	ERD25FJ563	Carbon	56K ohms 1/4W
R20	ERD25FJ472	Carbon	4.7K ohms 1/4W
R21	ERD25FJ103	Carbon	10K ohms 1/4W
R22	ERD25FJ563	Carbon	56K ohms 1/4W
R23,24	ERD25FJ153	Carbon	15K ohms 1/4W
R25	ERD25FJ562	Carbon	5.6K ohms 1/4W
R26	ERD25FJ103	Carbon	10K ohms 1/4W
R27	ERD25FJ102	Carbon	1K ohms 1/4W
R28-41	ERD25FJ103	Carbon	10K ohms 1/4W
R42	ERD50FJ181	Carbon	180 ohms 1/2W
R43	ERD25FJ103	Carbon	10K ohms 1/4W
R44	ERG1ANJ470	Metal	47 ohms 1W
C1	ECEB1ES4R7	Electrolytic	4.7 µF 25V
C2	ECEA1CS101	Electrolytic	100 µF 16V
C3-5	ECKF1H473ZF	Ceramic	0.047 µF 50V
C6	ECEA1CS101	Electrolytic	100 µF 16V
SW1	YW7F1EC0421	Input Selector Switch	
E10	WMT4X1R2X5	Insulator	
M22	YWJ5500FR02B	Mounting Angle for Switch (x2)	

WAVEFORM GENERATOR BOARD

SYMBOL NO.	PART NO.	DESCRIPTION	
PCB4	○YFJKZ4600E4A	Printed Circuit Board Assy	
TR1	2SA564-RS	Transistor	
TR2	2SC828AR	Transistor	
TR3-6	2SA564-RS	Transistor	
TR7	2SC828AR	Transistor	
TR8-10	2SA564-RS	Transistor	
TR11-14	2SC828AR	Transistor	
TR15	2SA564-RS	Transistor	
TR16	2SC828AR	Transistor	
TR17-20	2SA564-RS	Transistor	
TR21	2SC828AR	Transistor	
TR22-24	2SA564-RS	Transistor	
TR25-29	2SC828AR	Transistor	
TR30	2SA564-RS	Transistor	
TR31	2SC828AR	Transistor	
D1-4	MA162	Diode	
R1	ERD25FJ152	Carbon	1.5K ohms 1/4W
R2	ERD25FJ103	Carbon	10K ohms 1/4W
R3	ERD25FJ152	Carbon	1.5K ohms 1/4W
R4	ERD25FJ123	Carbon	12K ohms 1/4W
R5	ERD25FJ222	Carbon	2.2K ohms 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION	
R6	ERD25FJ221	Carbon	220 ohms 1/4W
R7	ERD25FJ563	Carbon	56K ohms 1/4W
R8	ERD25FJ821	Carbon	820 ohms 1/4W
R9	ERD25FJ472	Carbon	4.7K ohms 1/4W
R10	ERD25FJ221	Carbon	220 ohms 1/4W
R11	ERD25FJ332	Carbon	3.3K ohms 1/4W
R12	ERD25FJ103	Carbon	10K ohms 1/4W
R13	ERD25FJ223	Carbon	22K ohms 1/4W
R14,15	ERD25FJ102	Carbon	1K ohms 1/4W
R16	ERD25FJ222	Carbon	2.2K ohms 1/4W
R17,18	ERD25FJ103	Carbon	10K ohms 1/4W
R19	ERD25FJ562	Carbon	5.6K ohms 1/4W
R20	ERD25FJ222	Carbon	2.2K ohms 1/4W
R21,22	ERD25FJ332	Carbon	3.3K ohms 1/4W
R23	ERD25FJ122	Carbon	1.2K ohms 1/4W
R24,25	ERD25FJ103	Carbon	10K ohms 1/4W
R27	ERD25FJ681	Carbon	680 ohms 1/4W
R28	ERD25FJ101	Carbon	100 ohms 1/4W
R29	ERD25FJ472	Carbon	4.7K ohms 1/4W
R30	ERD25FJ821	Carbon	820 ohms 1/4W
R32	ERD25FJ101	Carbon	100 ohms 1/4W
R33	ERD25FJ122	Carbon	1.2K ohms 1/4W
R34,35	ERD25FJ152	Carbon	1.5K ohms 1/4W
R36	ERD25FJ103	Carbon	10K ohms 1/4W
R37	ERD25FJ222	Carbon	2.2K ohms 1/4W
R38	ERD25FJ221	Carbon	220 ohms 1/4W
R39	ERD25FJ472	Carbon	4.7K ohms 1/4W
R40	ERD25FJ821	Carbon	820 ohms 1/4W
R41	ERD25FJ472	Carbon	4.7K ohms 1/4W
R42	ERD25FJ221	Carbon	220 ohms 1/4W
R43	ERD25FJ222	Carbon	2.2K ohms 1/4W
R44	ERD25FJ103	Carbon	10K ohms 1/4W
R45	ERD25FJ223	Carbon	22K ohms 1/4W
R46,47	ERD25FJ102	Carbon	1K ohms 1/4W
R48	ERD25FJ222	Carbon	2.2K ohms 1/4W
R49,50	ERD25FJ103	Carbon	10K ohms 1/4W
R51	ERD25FJ562	Carbon	5.6K ohms 1/4W
R52	ERD25FJ222	Carbon	2.2K ohms 1/4W
R53,54	ERD25FJ102	Carbon	1K ohms 1/4W
R55	ERD25FJ122	Carbon	1.2K ohms 1/4W
R56,57	ERD25FJ103	Carbon	10K ohms 1/4W
R59	ERD25FJ471	Carbon	470 ohms 1/4W
R60	ERD25FJ101	Carbon	100 ohms 1/4W
R61	ERD25FJ472	Carbon	4.7K ohms 1/4W
R62	ERD25FJ821	Carbon	820 ohms 1/4W
R64	ERD25FJ101	Carbon	100 ohms 1/4W
R65	ERD25FJ122	Carbon	1.2K ohms 1/4W
R66	ERD25FJ472	Carbon	4.7K ohms 1/4W
R67	ERD25FJ222	Carbon	2.2K ohms 1/4W
R68	ERD25FJ560	Carbon	56 ohms 1/4W
R69	ERD25FJ103	Carbon	10K ohms 1/4W
R70	ERD25FJ272	Carbon	2.7K ohms 1/4W
R71	ERD25FJ103	Carbon	10K ohms 1/4W
R72	ERD25FJ472	Carbon	4.7K ohms 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION	
R73	ERD25FJ103	Carbon	10K ohms 1/4W
R74	ERD25FJ472	Carbon	4.7K ohms 1/4W
R75	ERG1ANJ470	Metal	47 ohms 1W
J31,58,63	ERDS2T0	Jumper Resistor	
VR1	YWSR19R47KB	Variable Resistor	47K ohms
VR2	YWSR19R2.2KB	Variable Resistor	2.2K ohms
VR3	YWSR19R4R7KB	Variable Resistor	4.7K ohms
VR4	YWSR19R2.2KB	Variable Resistor	2.2K ohms
C1	ECQM1H103KZ	Plastic	0.01 μF 50V
C2	ECQM1H102KZ	Plastic	1000 pF 50V
C3	ECEA1AS470	Electrolytic	47 μF 10V
C4	ECQM1H334KZ	Plastic	0.33 μF 50V
C5	ECEA1CSS100	Electrolytic	10 μF 16V
C6,7	ECEA1AS470	Electrolytic	47 μF 10V
C9	ECEA1CS101	Electrolytic	100 μF 16V
C10	ECCF1H270JC	Ceramic	27 pF 50V
C11	ECEA1AS470	Electrolytic	47 μF 10V
C12	ECQM1H682KZ	Plastic	6800 pF 50V
C13-15	ECEA1CSS100	Electrolytic	10 μF 16V
C17	ECEA1CS101	Electrolytic	100 μF 16V
SW1	YW6FL1EC0421	Input Selector Switch	
M22	YWJ5500FR02B	Mounting Angle for Switch (x2)	

WAVEFORM PROCESSOR BOARD

SYMBOL NO.	PART NO.	DESCRIPTION	
PCB5	YFJKZ4600P5A	Printed Circuit Board Assy	
IC1	YWMC14013BCP	IC	
TR1-9	2SA564-RS	Transistor	
TR10	2SC828AR	Transistor	
D1-4	MA162	Diode	
R1	ERD25FJ562	Carbon	5.6K ohms 1/4W
R2	ERD25FJ153	Carbon	15K ohms 1/4W
R3	ERD25FJ222	Carbon	2.2K ohms 1/4W
R4	ERD25FJ562	Carbon	5.6K ohms 1/4W
R5	ERD25FJ153	Carbon	15K ohms 1/4W
R6	ERD25FJ222	Carbon	2.2K ohms 1/4W
R7	ERD25FJ153	Carbon	15K ohms 1/4W
R8	ERD25FJ102	Carbon	1K ohms 1/4W
R9	ERD25FJ222	Carbon	2.2K ohms 1/4W
R10	ERD25FJ103	Carbon	10K ohms 1/4W
R11,12	ERD25FJ222	Carbon	2.2K ohms 1/4W
R13	ERD25FJ102	Carbon	1K ohms 1/4W
R14,15	ERD25FJ103	Carbon	10K ohms 1/4W
R16	ERD25FJ682	Carbon	6.8K ohms 1/4W
R17,18	ERD25FJ153	Carbon	15K ohms 1/4W
R19	ERD25FJ103	Carbon	10K ohms 1/4W
R20,21	ERD25FJ332	Carbon	3.3K ohms 1/4W
R22	ERD25FJ123	Carbon	12K ohms 1/4W
R23	ERD25FJ681	Carbon	680 ohms 1/4W
R24	ERD25FJ101	Carbon	100 ohms 1/4W
R25	ERD25FJ222	Carbon	2.2K ohms 1/4W
R26	ERD25FJ153	Carbon	15K ohms 1/4W
R27	ERD25FJ103	Carbon	10K ohms 1/4W
R28	ERD25FJ102	Carbon	1K ohms 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION	
R29	ERD25FJ332	Carbon	3.3K ohms 1/4W
R30	ERD25FJ100	Carbon	10 ohms 1/4W
R31	ERD25FJ821	Carbon	820 ohms 1/4W
R32	ERD25FJ332	Carbon	3.3K ohms 1/4W
R33	ERD25FJ153	Carbon	15K ohms 1/4W
R34	ERD25FJ332	Carbon	3.3K ohms 1/4W
R35	ERD25FJ681	Carbon	680 ohms 1/4W
R36	ERD25FJ223	Carbon	22K ohms 1/4W
R37	ERD25FJ681	Carbon	680 ohms 1/4W
R38	ERD25FJ104	Carbon	100K ohms 1/4W
R39	ERG1ANJ470	Metal	47 ohms 1W
C1	ECEA1ES100	Electrolytic	10 µF 25V
C2	ECCF1H151JR	Ceramic	150 pF 50V
C3	ECEA1ES470	Electrolytic	47 µF 25V
C5	ECCF1H101JC	Ceramic	100 pF 50V
C6	ECEA1ES3R3	Electrolytic	3.3 µF 25V
C8	ECEA1ES470	Electrolytic	47 µF 25V
C9	ECCF1H120JC	Ceramic	12 pF 50V
C10	ECEA1ES470	Electrolytic	47 µF 25V
C11	ECCF1H330JC	Ceramic	33 pF 50V
C12,13	ECEA1CSS100	Electrolytic	10 µF 16V
C14	ECKF1H473ZF	Ceramic	0.047 µF 50V
C15	ECEA1CS101	Electrolytic	100 µF 16V
SW1	YW4FL1EC0421	Input Selector Switch	
M22	YWJ5500FR02B	Mounting Angle for Switch	

PREVIEW/EFFECT OUTPUT BOARD

SYMBOL NO.	PART NO.	DESCRIPTION	
PCB6	○ YFJKZ4600E6A	Printed Circuit Board Assy	
IC1	MN4011B	IC	
IC2	YWMC14528BCP	IC	
TR1	2SA564-RS	Transistor	
TR2	2SC828AR	Transistor	
TR3	2SA564-RS	Transistor	
TR4	2SC828AR	Transistor	
TR5	2SA838-BC	Transistor	
TR6	2SC1047-CD	Transistor	
TR7	2SA838-BC	Transistor	
TR8	2SC1047-CD	Transistor	
TR9	2SK381-C	Transistor	
TR10	2SK19-Y	Transistor	
TR11	2SC828AR	Transistor	
TR12	2SC1047-CD	Transistor	
TR13	2SC1383-PQ	Transistor	
TR15,16	2SA564-RS	Transistor	
TR17	2SC828AR	Transistor	
TR18	2SA838-BC	Transistor	
TR19	2SC1047-CD	Transistor	
TR20	2SC1383-PQ	Transistor	
TR22	2SK381-C	Transistor	
TR23-25	2SA564-RS	Transistor	
TR26	2SC828AR	Transistor	
TR27,28	2SA564-RS	Transistor	
TR29	2SA838-BC	Transistor	
D2	MA162	Diode	
R1	ERD25FJ102	Carbon	1K ohms 1/4W
R2	ERD25FJ151	Carbon	150 ohms 1/4W
R3,4	ERD25FJ101	Carbon	100 ohms 1/4W
R5,7	ERD25FJ102	Carbon	1K ohms 1/4W
R8,9	ERD25FJ101	Carbon	100 ohms 1/4W
R12	ERD25FJ101	Carbon	100 ohms 1/4W
R13	ERD25FJ102	Carbon	1K ohms 1/4W
R14	ERD25FJ103	Carbon	10K ohms 1/4W
R16	ERD25FJ222	Carbon	2.2K ohms 1/4W
R17	ERD25FJ103	Carbon	10K ohms 1/4W
R18	ERD25FJ222	Carbon	2.2K ohms 1/4W
R20	ERD25FJ104	Carbon	100K ohms 1/4W
R21	ERD25FJ332	Carbon	3.3K ohms 1/4W
R22	ERD25FJ102	Carbon	1K ohms 1/4W
R23	ERD25FJ222	Carbon	2.2K ohms 1/4W
R24	ERD25FJ821	Carbon	820 ohms 1/4W
R25	ERD25FJ560	Carbon	56 ohms 1/4W
R26	ERD25FJ332	Carbon	3.3K ohms 1/4W
R27	ERD25FJ561	Carbon	560 ohms 1/4W
R28	ERD25FJ332	Carbon	3.3K ohms 1/4W
R29	ERD25FJ821	Carbon	820 ohms 1/4W
R30	ERD25FJ560	Carbon	56 ohms 1/4W
R31	ERD25FJ272	Carbon	2.7K ohms 1/4W
R32	ERD25FJ181	Carbon	180 ohms 1/4W
R33	ERD25FJ123	Carbon	12K ohms 1/4W
R35	ERD25FJ223	Carbon	22K ohms 1/4W
R38	ERD25FJ562	Carbon	5.6K ohms 1/4W
R39	ERD25FJ103	Carbon	10K ohms 1/4W
R40	ERD25FJ332	Carbon	3.3K ohms 1/4W
R41	ERD25FJ102	Carbon	1K ohms 1/4W
R42	ERD25FJ222	Carbon	2.2K ohms 1/4W
R43	ERD25FJ563	Carbon	56K ohms 1/4W
R44	ERD25FJ684	Carbon	680K ohms 1/4W
R45	ERD25FJ562	Carbon	5.6K ohms 1/4W
R46	ERD25FJ124	Carbon	120K ohms 1/4W
R47	ERD25FJ103	Carbon	10K ohms 1/4W
R48	ERD25FJ221	Carbon	220 ohms 1/4W
R49	ERD25FJ182	Carbon	1.8K ohms 1/4W
R50	ERD25FJ560	Carbon	56 ohms 1/4W
R51	ERD25FJ561	Carbon	560 ohms 1/4W
R52,53	ERD25FJ332	Carbon	3.3K ohms 1/4W
R54	ERD25FJ391	Carbon	390 ohms 1/4W
R55	ERD25FJ560	Carbon	56 ohms 1/4W
R56	ERD25FJ332	Carbon	3.3K ohms 1/4W
R57	ERD25FJ181	Carbon	180 ohms 1/4W
R58	ERD25FJ153	Carbon	15K ohms 1/4W
R60	ERD25FJ223	Carbon	22K ohms 1/4W
R63	ERD25FJ104	Carbon	100K ohms 1/4W
R64	ERD25FJ102	Carbon	1K ohms 1/4W
R65	ERD25FJ222	Carbon	2.2K ohms 1/4W
R66	ERD25FJ562	Carbon	5.6K ohms 1/4W
R67	ERD25FJ222	Carbon	2.2K ohms 1/4W
R68	ERD25FJ473	Carbon	47K ohms 1/4W
R69	ERD25FJ684	Carbon	680K ohms 1/4W
R70	ERD25FJ562	Carbon	5.6K ohms 1/4W
R71	ERD25FJ124	Carbon	120K ohms 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION	
R72	ERD25FJ103	Carbon	10K ohms 1/4W
R73	ERD25FJ221	Carbon	220 ohms 1/4W
R74	ERD25FJ182	Carbon	1.8K ohms 1/4W
R75	ERD25FJ102	Carbon	1K ohms 1/4W
R76,77	ERD25FJ221	Carbon	220 ohms 1/4W
VR1	YWSR29R470B	Variable Resistor	470 ohms
VR2	YWSR19R680B	Variable Resistor	680 ohms
VR3,5	YWSR19R470B	Variable Resistor	470 ohms
VR6	YWSR19R680B	Variable Resistor	680 ohms
VR7	YWSR19R2.2KB	Variable Resistor	2.2K ohms
VR9	EVCB0AK20B13	Variable Resistor	1K ohms
C1-3	ECCF1H820JC	Ceramic	82 pF 50V
C6	ECEA1CS101	Electrolytic	100 µF 16V
C7	ECQM1H223KZ	Plastic	0.022 µF 50V
C8	ECCF1H270JC	Ceramic	27 pF 50V
C9,10	ECEA1CSS100	Electrolytic	10 µF 16V
C12	ECCF1H080DC	Ceramic	8 pF 50V
C13	ECEA1AS470	Electrolytic	47 µF 10V
C14	ECEA0JSS102	Electrolytic	1000 µF 6.3V
C16	ECEA1CSS100	Electrolytic	10 µF 16V
C17	ECEA1ES3R3	Electrolytic	3.3 µF 25V
C18	ECQM1H102KZ	Plastic	1000 pF 50V
C19	ECEA1CS101	Electrolytic	100 µF 16V
C22	ECEA1AS470	Electrolytic	47 µF 10V
C23	ECEA0JSS102	Electrolytic	1000 µF 6.3V
C26	ECQM1H223KZ	Plastic	0.022 µF 50V
C27	ECCF1H270JC	Ceramic	27 pF 50V
C28	ECEA1CSS100	Electrolytic	10 µF 16V
C29	ECEA1ES3R3	Electrolytic	3.3 µF 25V
C30	ECQM1H102KZ	Plastic	1000 pF 50V
C31	ECEA1CS101	Electrolytic	100 µF 16V
C32	ECCF1H560JC	Ceramic	56 pF 50V
C33	ECCF1H390JC	Ceramic	39 pF 50V
C34	ECCF1H151JR	Ceramic	150 pF 50V
C35	ECCF1H121JC	Ceramic	120 pF 50V
CT5	ECV1ZW25X53T	Trimmer Capacitor	25 pF
CT11	ECV1ZW25X53T	Trimmer Capacitor	25 pF
CT20	ECV1ZW25X53T	Trimmer Capacitor	25 pF
L1,2	YSP0406L470K	Coil	47 µH
M35	YWJ4600AM04A	Mounting Angle B for VR	

PROGRAM OUTPUT BOARD

SYMBOL NO.	PART NO.	DESCRIPTION	
PCB7	°YFJKZ4600E7A	Printed Circuit Board Assy	
IC1	AN-904	IC	
TR1	2SC828AR	Transistor	
TR2,3	2SC1216F	Transistor	
TR4,5	2SC828AR	Transistor	
TR6	2SA564-RS	Transistor	
TR7-9	2SC828AR	Transistor	
TR10	2SK381-C	Transistor	
TR11,12	2SC828AR	Transistor	
TR13	2SA838-BC	Transistor	
TR14	2SK381-C	Transistor	
TR15	2SA1127-TU	Transistor	
TR16	2SC828AR	Transistor	
TR17	2SA564-RS	Transistor	
TR18	2SC1047-CD	Transistor	
TR19	2SC828AR	Transistor	
TR20	2SC1047-CD	Transistor	
TR21,22	2SA564-RS	Transistor	
TR23	2SC828AR	Transistor	
TR24	2SC1047-CD	Transistor	
TR25	2SC828AR	Transistor	
TR27	2SC1383-PQ	Transistor	
TR28	2SA683-PQ	Transistor	
TR29	2SC1318-RS	Transistor	
TR30	2SC828AR	Transistor	
TR31	2SA564-RS	Transistor	
D1-4	MA162	Diode	
R1	ERD25FJ223	Carbon	22K ohms 1/4W
R2	ERD25FJ123	Carbon	12K ohms 1/4W
R3	ERD25FJ101	Carbon	100 ohms 1/4W
R4	ERD25FJ222	Carbon	2.2K ohms 1/4W
R5	ERD25FJ332	Carbon	3.3K ohms 1/4W
R6	ERD25FJ222	Carbon	2.2K ohms 1/4W
R7,8	ERD25FJ562	Carbon	5.6K ohms 1/4W
R9,10	ERD25FJ223	Carbon	22K ohms 1/4W
R11	ERD25FJ102	Carbon	1K ohms 1/4W
R12	ERD25FJ151	Carbon	150 ohms 1/4W
R14	ERD25FJ393	Carbon	39K ohms 1/4W
R15	ERD25FJ223	Carbon	22K ohms 1/4W
R16	ERD25FJ101	Carbon	100 ohms 1/4W
R17	ERD25FJ222	Carbon	2.2K ohms 1/4W
R18	ERD25FJ102	Carbon	1K ohms 1/4W
R19	ERD25FJ223	Carbon	22K ohms 1/4W
R20	ERD25FJ153	Carbon	15K ohms 1/4W
R21	ERD25FJ152	Carbon	1.5K ohms 1/4W
R22,23	ERD25FJ103	Carbon	10K ohms 1/4W
R24	ERD25FJ223	Carbon	22K ohms 1/4W
R25	ERD25FJ222	Carbon	2.2K ohms 1/4W
R26	ERD25FJ472	Carbon	4.7K ohms 1/4W
R28	ERD25FJ102	Carbon	1K ohms 1/4W
R29	ERD25FJ222	Carbon	2.2K ohms 1/4W
R30	ERD25FJ104	Carbon	100K ohms 1/4W
R31	ERD25FJ271	Carbon	270 ohms 1/4W
R32	ERD25FJ182	Carbon	1.8K ohms 1/4W
R33	ERD25FJ153	Carbon	15K ohms 1/4W
R34	ERD25FJ222	Carbon	2.2K ohms 1/4W
R35	ERD25FJ102	Carbon	1K ohms 1/4W
R36	ERD25FJ821	Carbon	820 ohms 1/4W
R37	ERD25FJ562	Carbon	5.6K ohms 1/4W
R39	ERD25FJ102	Carbon	1K ohms 1/4W
R40	ERD25FJ102	Carbon	1K ohms 1/4W
R41	ERD25FJ153	Carbon	15K ohms 1/4W
R42	ERD25FJ472	Carbon	4.7K ohms 1/4W
R43	ERD25FJ272	Carbon	2.7K ohms 1/4W
R44	ERD25FJ821	Carbon	820 ohms 1/4W
R45	ERD25FJ153	Carbon	15K ohms 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION	
R46	ERD25FJ821	Carbon	820 ohms 1/4W
R47	ERD25FJ472	Carbon	4.7K ohms 1/4W
R48	ERD25FJ561	Carbon	560 ohms 1/4W
R49,51	ERD25FJ152	Carbon	1.5K ohms 1/4W
R52	ERD25FJ561	Carbon	560 ohms 1/4W
R53	ERD25FJ681	Carbon	680 ohms 1/4W
R54	ERD25FJ271	Carbon	270 ohms 1/4W
R55	ERD25FJ681	Carbon	680 ohms 1/4W
R56	ERD25FJ122	Carbon	1.2K ohms 1/4W
R57	ERD25FJ222	Carbon	2.2K ohms 1/4W
R58	ERD25FJ392	Carbon	3.9K ohms 1/4W
R59	ERD25FJ101	Carbon	100 ohms 1/4W
R60	ERD25FJ681	Carbon	680 ohms 1/4W
R61	ERD25FJ222	Carbon	2.2K ohms 1/4W
R62	ERD25FJ332	Carbon	3.3K ohms 1/4W
R63	ERD25FJ682	Carbon	6.8K ohms 1/4W
R64	ERD25FJ102	Carbon	1K ohms 1/4W
R65	ERD25FJ332	Carbon	3.3K ohms 1/4W
R66	ERD25FJ682	Carbon	6.8K ohms 1/4W
R67	ERD25FJ332	Carbon	3.3K ohms 1/4W
R69	ERD25FJ561	Carbon	560 ohms 1/4W
R70	ERD25FJ271	Carbon	270 ohms 1/4W
R71	ERD25FJ561	Carbon	560 ohms 1/4W
R72	ERD25FJ222	Carbon	2.2K ohms 1/4W
R73	ERD25FJ272	Carbon	2.7K ohms 1/4W
R74	ERD25FJ821	Carbon	820 ohms 1/4W
R75	ERD25FJ221	Carbon	220 ohms 1/4W
R76	ERD25FJ560	Carbon	56 ohms 1/4W
R77	ERD25FJ103	Carbon	10K ohms 1/4W
R78	ERD25FJ122	Carbon	1.2K ohms 1/4W
R83	ERD25FJ331	Carbon	330 ohms 1/4W
R84,85	ERD25FJ101	Carbon	100 ohms 1/4W
R86,87	ERD25FJ2R2	Carbon	2.2 ohms 1/4W
R88	ERD25FJ103	Carbon	10K ohms 1/4W
R89	ERD25FJ152	Carbon	1.5K ohms 1/4W
R90	ERD25FJ103	Carbon	10K ohms 1/4W
R91	ERD25FJ331	Carbon	330 ohms 1/4W
R92-94	ERG1ANJ470	Metal	47 ohms 1W
R95	ERD25FJ223	Carbon	22K ohms 1/4W
R96	ERD25FJ472	Carbon	4.7K ohms 1/4W
R97	ERD25FJ103	Carbon	10K ohms 1/4W
R98	ERD25FJ222	Carbon	2.2K ohms 1/4W
J3	ERDS2TO	Jumper Resistor	
VR1	YCVRJ6PK201B	Variable Resistor	200 ohms
VR2	YCVRJ6PK103B	Variable Resistor	10K ohms
VR3	YWSR29D2.2KB	Variable Resistor	2.2K ohms
VR4	YCVRJ6PK502B	Variable Resistor	5K ohms
VR5	YCVRJ6PK102B	Variable Resistor	1K ohms
VR6	YCVRJ6PK202B	Variable Resistor	2K ohms
VR7	YCVRJ6PK501B	Variable Resistor	500 ohms
VR9	YCVRJ6PK502B	Variable Resistor	5K ohms
C1-3	ECQM1H103KZ	Plastic	0.01 µF 50V
C4	ECCF1H270JC	Ceramic	27 pF 50V
C5	ECQM1H103KZ	Plastic	0.01 µF 50V
C6	ECEA1CS470	Electrolytic	47 µF 16V
C7,8	ECEA1ES100	Electrolytic	10 µF 25V
C9	ECKF1H471KB	Ceramic	470 pF 50V

SYMBOL NO.	PART NO.	DESCRIPTION	
C10	ECCF1H390JC	Ceramic	39 pF 50V
C11	ECEA1AS470	Electrolytic	47 µF 10V
C12	ECQM1H223KZ	Plastic	0.022 µF 50V
C13	ECEA1AS470	Electrolytic	47 µF 10V
C14	ECEA1CS101	Electrolytic	100 µF 16V
C16	ECQM1H104JZ	Plastic	0.1 µF 50V
C17	ECCF1H270JC	Ceramic	27 pF 50V
C18	ECEA1CSS100	Electrolytic	10 µF 16V
C19	ECKF1H473ZF	Ceramic	0.047 µF 50V
C20-22	ECEA1CSS100	Electrolytic	10 µF 16V
C23	ECCF1H151JR	Ceramic	150 pF 50V
C24,25	ECEA1CSS100	Electrolytic	10 µF 16V
C29	ECEA1AS101	Electrolytic	100 µF 10V
C30	ECCF1H030C	Ceramic	3 pF 50V
C32	ECCF1H070DC	Ceramic	7 pF 50V
C33	ECEA1CSS100	Electrolytic	10 µF 16V
C34,35	ECEA0JSS102	Electrolytic	1000 µF 6.3V
CT27	ECV1ZW20X32	Trimmer Capacitor	20 pF
L1	YSP0406L470K	Coil	47 µH
L2	YSP0406L100K	Coil	10 µH
L3	YSP0406L470K	Coil	47 µH
SW1	YW1FL-2AC042	Push Switch	
SW2	YW2FL1EC0421	Push Switch	
M22	YWJ5500FR02B	Mounting Angle A for Switch (x4)	
M33	YWJ4600AM08	Shield Plate	

SUBCARRIER BOARD

SYMBOL NO.	PART NO.	DESCRIPTION	
PCB8	○ YFJKZ4600E8A	Printed Circuit Board Assy	
IC1	AN236	IC	
IC2	YWMC14053BCP	IC	
IC3	YWMC14528BCP	IC	
Q1-4	2SC828AR	Transistor	
Q5	2SA564-RS	Transistor	
Q6-9	2SC828AR	Transistor	
Q10,11	2SC1047-CD	Transistor	
Q12	2SA564-RS	Transistor	
Q13	2SC1047-CD	Transistor	
Q14	2SC1215-ST	Transistor	
Q15-17	2SC828AR	Transistor	
Q18	2SC1318-RS	Transistor	
Q19	2SA720-RS	Transistor	
Q20	2SC828AR	Transistor	
Q21,22	2SA564-RS	Transistor	
Q24	2SC828AR	Transistor	
Q25	2SC1318-RS	Transistor	
Q26	2SA720-RS	Transistor	
D1,2	MA27TA	Diode	
R1,2	ERD25FJ272	Carbon	2.7K ohms 1/4W
R3	ERD25FJ332	Carbon	3.3K ohms 1/4W
R4	ERD25FJ102	Carbon	1K ohms 1/4W
R5	ERD25FJ223	Carbon	22K ohms 1/4W
R6	ERD25TJ103	Carbon	10K ohms 1/4W
R7	ERD25FJ222	Carbon	2.2K ohms 1/4W
R8,9	ERD25FJ561	Carbon	560 ohms 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION	
R10	ERD25FJ562	Carbon	5.6K ohms 1/4W
R11	ERD25FJ181	Carbon	180 ohms 1/4W
R12	ERD25TJ103	Carbon	10K ohms 1/4W
R13	ERD25FJ223	Carbon	22K ohms 1/4W
R14	ERD25FJ561	Carbon	560 ohms 1/4W
R15	ERD25FJ102	Carbon	1K ohms 1/4W
R16,17	ERD25FJ153	Carbon	15K ohms 1/4W
R18	ERD25FJ102	Carbon	1K ohms 1/4W
R19	ERD25FJ392	Carbon	3.9K ohms 1/4W
R20	ERD25TJ103	Carbon	10K ohms 1/4W
R21	ERD25FJ272	Carbon	2.7K ohms 1/4W
R22	ERD25FJ183	Carbon	18K ohms 1/4W
R23	ERD25TJ103	Carbon	10K ohms 1/4W
R24	ERD25FJ681	Carbon	680 ohms 1/4W
R25	ERD25FJ471	Carbon	470 ohms 1/4W
R26	ERD25FJ681	Carbon	680 ohms 1/4W
R27	ERD25FJ471	Carbon	470 ohms 1/4W
R28	ERD25FJ821	Carbon	820 ohms 1/4W
R29,30	ERD25FJ123	Carbon	12K ohms 1/4W
R31	ERD25FJ391	Carbon	390 ohms 1/4W
R32	ERD25FJ222	Carbon	2.2K ohms 1/4W
R33,34	ERD25FJ561	Carbon	560 ohms 1/4W
R35	ERD25FJ392	Carbon	3.9K ohms 1/4W
R36	ERD25FJ471	Carbon	470 ohms 1/4W
R37	ERD25FJ750	Carbon	75 ohms 1/4W
R38	ERD25FJ392	Carbon	3.9K ohms 1/4W
R39	ERD25FJ151	Carbon	150 ohms 1/4W
R40,41	ERD25FJ153	Carbon	15K ohms 1/4W
R42	ERD25FJ122	Carbon	1.2K ohms 1/4W
R43	ERD25FJ221	Carbon	220 ohms 1/4W
R44	ERD25FJ271	Carbon	270 ohms 1/4W
R45	ERD25FJ562	Carbon	5.6K ohms 1/4W
R46	ERD25FJ332	Carbon	3.3K ohms 1/4W
R47	ERD25TJ682	Carbon	6.8K ohms 1/4W
R48	ERD25FJ681	Carbon	680 ohms 1/4W
R49	ERD25FJ821	Carbon	820 ohms 1/4W
R50	ERD25TJ682	Carbon	6.8K ohms 1/4W
R51	ERD25FJ681	Carbon	680 ohms 1/4W
R52	ERD25TJ103	Carbon	10K ohms 1/4W
R53	ERD25FJ333	Carbon	33K ohms 1/4W
R54	ERD25FJ822	Carbon	8.2K ohms 1/4W
R55	ERD25FJ181	Carbon	180 ohms 1/4W
R56,57	ERD25FJ562	Carbon	5.6K ohms 1/4W
R58,59	ERD25TJ2R2	Carbon	2.2 ohms 1/4W
R60	ERD25FJ104	Carbon	100K ohms 1/4W
R61	ERD25FJ153	Carbon	15K ohms 1/4W
R62,63	ERD25FJ472	Carbon	4.7K ohms 1/4W
R64	ERD25FJ104	Carbon	100K ohms 1/4W
R65,66	ERD25TJ682	Carbon	6.8K ohms 1/4W
R67	ERD25FJ332	Carbon	3.3K ohms 1/4W
R68	ERD25FJ560	Carbon	56 ohms 1/4W
R72	ERD25FJ333	Carbon	33K ohms 1/4W
R73	ERD25FJ822	Carbon	8.2K ohms 1/4W
R74	ERD25FJ560	Carbon	56 ohms 1/4W
R75,76	ERD25FJ562	Carbon	5.6K ohms 1/4W
R77,78	ERD25FJ220	Carbon	22 ohms 1/4W
R79	ERD25FJ104	Carbon	100K ohms 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION	
VR1	YWH0621A4R7K	Variable Resistor	4.7K ohms
VR2	EWKE1AS15A23	Variable Resistor	2K ohms
VR3	EVM8AGA00B13	Variable Resistor	1K ohms
VR4	YWH0621A4R7K	Variable Resistor	4.7K ohms
VR5	EVM8AGA00BQ2	Variable Resistor	470 ohms
VR6	YWSR29D1KB	Variable Resistor	1K ohms
C1,2	ECQM1H103KZ	Plastic	0.01 μF 50V
C3	ECKF1H821KB	Ceramic	820 pF 50V
C4	ECCF1H270JC	Ceramic	27 pF 50V
C5	ECQM1H103KZ	Plastic	0.01 μF 50V
C6	ECQM1H222KZ	Plastic	2200 pF 50V
C7-10	ECQM1H103KZ	Plastic	0.01 μF 50V
C11	ECCF1H221JC	Ceramic	220 pF 50V
C12	ECQM1H222KZ	Plastic	2200 pF 50V
C13	ECEA1CS470	Electrolytic	47 μF 16V
C14	ECEA1HS010S	Electrolytic	1 μF 50V
C15	ECEA1CSS100	Electrolytic	10 μF 16V
C16	ECQM1H102KZ	Plastic	1000 pF 50V
C17	ECCF1H270JC	Ceramic	27 pF 50V
C18	ECCF1H560JC	Ceramic	56 pF 50V
C19	ECCF1H220JC	Ceramic	22 pF 50V
C20	ECEA1CS330	Electrolytic	33 μF 16V
C21	ECQM1H393KZ	Plastic	0.039 μF 50V
C22	ECCF1H270JC	Ceramic	27 pF 50V
C23	ECCF1H101JC	Ceramic	100 pF 50V
C24	ECCF1H270JC	Ceramic	27 pF 50V
C25	ECCF1H101JC	Ceramic	100 pF 50V
C26	ECQM1H103KZ	Plastic	0.01 μF 50V
C27	ECQM1H333KZ	Plastic	0.033 μF 50V
C28	ECCF1H330JC	Ceramic	33 pF 50V
C29	ECQM1H333KZ	Plastic	0.033 μF 50V
C30	ECQM1H223KZ	Plastic	0.022 μF 50V
C31	ECQM1H333KZ	Plastic	0.033 μF 50V
C32	ECCF1H680JC	Ceramic	68 pF 50V
C33	ECCF1H220JC	Ceramic	22 pF 50V
C34	ECCF1H151JR	Ceramic	150 pF 50V
C35	ECCF1H820JC	Ceramic	82 pF 50V
C36	ECCF1H330JC	Ceramic	33 pF 50V
C37	ECQM1H103KZ	Plastic	0.01 μF 50V
C38	ECEA1CSS100	Electrolytic	10 μF 16V
C40	ECCF1H330JC	Ceramic	33 pF 50V
C41	ECCF1H470JC	Ceramic	47 pF 50V
C42	ECQM1H103KZ	Plastic	0.01 μF 50V
C43	ECQM1H333KZ	Plastic	0.033 μF 50V
C44	ECCF1H820JC	Ceramic	82 pF 50V
C45	ECEA1CSS100	Electrolytic	10 μF 16V
C46,47	ECQM1H152KZ	Plastic	1500 pF 50V
C48,49	ECEA1CSS100	Electrolytic	10 μF 16V
C50	ECQM1H333KZ	Plastic	0.033 μF 50V
C51	ECCF1H820JC	Ceramic	82 pF 50V
C52	ECEA1CSS100	Electrolytic	10 μF 16V
C61	ECEA1CS101	Electrolytic	100 μF 16V
C62,63	ECSF1CE476	Electrolytic	47 μF 16V
C64	ECQM1H104KZ	Plastic	0.1 μF 50V
C65	ECQM1H103KZ	Plastic	0.01 μF 50V
C66,67	ECSF1CE476	Electrolytic	47 μF 16V

SYMBOL NO.	PART NO.	DESCRIPTION	
C68	ECEA1CS101	Electrolytic	100 μF 16V
C69	ECQM1H104KZ	Plastic	0.1 μF 50V
C70	ECSF1CE476	Electrolytic	47 μF 16V
L1	YWLS-7560J	Coil	56 μH
L2	YWLS-7150J	Coil	15 μH
L3	YWLS-7331J	Coil	330 μH
L4	YWLS-7100J	Coil	10 μH
L5	YWLS-76R8J	Coil	6.8 μH
L6	YWENPHASE	Coil	
L7,8	YWLS-7150J	Coil	15 μH
X1	YWHC18U4R4M	Crystal Oscillator	
JK1	YWLJ145-1A	Jack	
M13	YWJ4600AM03A	Mounting Angle B for Jack	
M39	YWJ5500AM07	Mounting Angle C for Switch	
M49	YWA620AER01	Insulator Washer	

SYNC GENERATOR BOARD

SYMBOL NO.	PART NO.	DESCRIPTION	
PCB9	°YFJKZ4600E9A	Printed Circuit Board Assy	
IC1	YWHD74LS00P	IC	
IC2	YWHD74221P	IC	
IC3	YWHD74LS221P	IC	
IC4	NJM78M05A	IC	
IC5	YWHD74LS221P	IC	
IC6	MN6065	IC	
IC7	YWHD74221P	IC	
IC8	YW-MC4044P	IC	
Q1	2SC828AR	Transistor	
Q2	2SA564-RS	Transistor	
Q3,4	2SC1047-CD	Transistor	
Q5	2SA564-RS	Transistor	
Q6	2SC828AR	Transistor	
Q7,8	2SA564-RS	Transistor	
Q9-11	2SC828AR	Transistor	
Q12	2SA564-RS	Transistor	
Q13	2SC828AR	Transistor	
Q14	2SA564-RS	Transistor	
Q15	2SC1047-CD	Transistor	
Q16	2SC828AR	Transistor	
Q18	2SC1318-RS	Transistor	
Q19	2SA720-RS	Transistor	
Q20	2SC1216F	Transistor	
Q21	2SC1318-RS	Transistor	
Q22	2SA720-RS	Transistor	
Q23	2SC1216F	Transistor	
Q24	2SC1318-RS	Transistor	
Q25	2SA720-RS	Transistor	
Q26	2SC1216F	Transistor	
Q27	2SC1318-RS	Transistor	
Q28	2SA720-RS	Transistor	
Q29	2SC1216F	Transistor	
Q30	2SC1318-RS	Transistor	
Q31	2SA720-RS	Transistor	
Q32	2SC1216F	Transistor	
Q33	2SC1318-RS	Transistor	
Q34	2SA720-RS	Transistor	
Q35	2SC1216F	Transistor	
Q36-38	2SC828AR	Transistor	

SYMBOL NO.	PART NO.	DESCRIPTION	
Q39	2SK19-Y	Transistor	
Q40	2SC828AR	Transistor	
Q41	2SA564-RS	Transistor	
D1	MA162	Diode	
D2	0A90RADI0	Diode	
D3,5	YUD1S2139C	Diode	
R1,2	ERD25FJ223	Carbon	22K ohms 1/4W
R3	ERD25FJ101	Carbon	100 ohms 1/4W
R4	ERD25FJ821	Carbon	820 ohms 1/4W
R5	ERD25FJ271	Carbon	270 ohms 1/4W
R6	ERD25FJ153	Carbon	15K ohms 1/4W
R7	ERD25FJ823	Carbon	82K ohms 1/4W
R8	ERD25FJ122	Carbon	1.2K ohms 1/4W
R9	ERD25FJ102	Carbon	1K ohms 1/4W
R10	ERD25FJ562	Carbon	5.6K ohms 1/4W
R11	ERD25FJ122	Carbon	1.2K ohms 1/4W
R12	ERD25FJ102	Carbon	1K ohms 1/4W
R13	ERD25FJ471	Carbon	470 ohms 1/4W
R14	ERD25FJ123	Carbon	12K ohms 1/4W
R15	ERD25FJ122	Carbon	1.2K ohms 1/4W
R16	ERD25FJ471	Carbon	470 ohms 1/4W
R17	ERD25FJ102	Carbon	1K ohms 1/4W
R18	ERD25FJ333	Carbon	33K ohms 1/4W
R19	ERD25FJ223	Carbon	22K ohms 1/4W
R20	ERD25FJ681	Carbon	680 ohms 1/4W
R21	ERD25FJ122	Carbon	1.2K ohms 1/4W
R22	ERD25FJ561	Carbon	560 ohms 1/4W
R23	ERD25FJ272	Carbon	2.7K ohms 1/4W
R24	ERD25FJ563	Carbon	56K ohms 1/4W
R25	ERD25FJ102	Carbon	1K ohms 1/4W
R26	ERD25FJ272	Carbon	2.7K ohms 1/4W
R27	ERD25FJ222	Carbon	2.2K ohms 1/4W
R28	ERD25FJ102	Carbon	1K ohms 1/4W
R29	ERD25FJ562	Carbon	5.6K ohms 1/4W
R30	ERD25FJ222	Carbon	2.2K ohms 1/4W
R31	ERD25FJ272	Carbon	2.7K ohms 1/4W
R32	ERD25FJ181	Carbon	180 ohms 1/4W
R33	ERD25FJ392	Carbon	3.9K ohms 1/4W
R34	ERD25FJ122	Carbon	1.2K ohms 1/4W
R35	ER025CKF1002	Metal	10K ohms 1/4W
R36	ER025CKF1202	Metal	12K ohms 1/4W
R37	ER025CKF1002	Metal	10K ohms 1/4W
R39	ERG1ANJ100	Metal	10 ohms 1W
R40	ERD25FJ561	Carbon	560 ohms 1/4W
R41	ERD25FJ102	Carbon	1K ohms 1/4W
R42	ER025CKF3902	Metal	39K ohms 1/4W
R43	ER025CKF4701	Metal	4.7K ohms 1/4W
R44	ER025CKF8201	Metal	8.2K ohms 1/4W
R45	ERD25FJ562	Carbon	5.6K ohms 1/4W
R46	ERD25FJ272	Carbon	2.7K ohms 1/4W
R47	ERD25FJ152	Carbon	1.5K ohms 1/4W
R48,49	ERD25FJ472	Carbon	4.7K ohms 1/4W
R50,51	ERD25FJ123	Carbon	12K ohms 1/4W
R52	ERD25FJ101	Carbon	100 ohms 1/4W
R53	ERD25FJ152	Carbon	1.5K ohms 1/4W
R54	ERD25FJ102	Carbon	1K ohms 1/4W

SYM-BOL NO.	PART NO.	DESCRIPTION	
R55	ERD25FJ333	Carbon	33K ohms 1/4W
R56	ERD25FJ104	Carbon	100K ohms 1/4W
R57	ERD25FJ102	Carbon	1K ohms 1/4W
R58	ERD25FJ153	Carbon	15K ohms 1/4W
R59	ERD25FJ222	Carbon	2.2K ohms 1/4W
R60	ERD25FJ102	Carbon	1K ohms 1/4W
R61	ERD25FJ822	Carbon	8.2K ohms 1/4W
R62	ERD25FJ561	Carbon	560 ohms 1/4W
R63	ERD25FJ101	Carbon	100 ohms 1/4W
R65	ERD25FJ272	Carbon	2.7K ohms 1/4W
R66	ERD25TJ103	Carbon	10K ohms 1/4W
R67	ERD25FJ152	Carbon	1.5K ohms 1/4W
R68	ER025CKF6201	Metal	6.2K ohms 1/4W
R69	ER025CKF8201	Metal	8.2K ohms 1/4W
R72,73	ERD25FJ100	Carbon	10 ohms 1/4W
R74	ERD25FJ560	Carbon	56 ohms 1/4W
R75	ERD25FJ561	Carbon	560 ohms 1/4W
R76	ERD25TJ103	Carbon	10K ohms 1/4W
R77	ERD25FJ562	Carbon	5.6K ohms 1/4W
R78,79	ERD25FJ100	Carbon	10 ohms 1/4W
R80	ERD25FJ560	Carbon	56 ohms 1/4W
R81	ERD25FJ561	Carbon	560 ohms 1/4W
R82	ERD25TJ103	Carbon	10K ohms 1/4W
R83	ERD25FJ562	Carbon	5.6K ohms 1/4W
R84,85	ERD25FJ100	Carbon	10 ohms 1/4W
R86	ERD25FJ560	Carbon	56 ohms 1/4W
R87	ERD25FJ561	Carbon	560 ohms 1/4W
R88	ERD25TJ103	Carbon	10K ohms 1/4W
R89	ERD25FJ562	Carbon	5.6K ohms 1/4W
R90,91	ERD25FJ100	Carbon	10 ohms 1/4W
R92	ERD25FJ560	Carbon	56 ohms 1/4W
R93	ERD25FJ561	Carbon	560 ohms 1/4W
R94	ERD25TJ103	Carbon	10K ohms 1/4W
R95	ERD25FJ562	Carbon	5.6K ohms 1/4W
R96,97	ERD25FJ100	Carbon	10 ohms 1/4W
R98	ERD25FJ560	Carbon	56 ohms 1/4W
R99	ERD25FJ561	Carbon	560 ohms 1/4W
R100	ERD25TJ103	Carbon	10K ohms 1/4W
R101	ERD25FJ562	Carbon	5.6K ohms 1/4W
R102,103	ERD25FJ100	Carbon	10 ohms 1/4W
R104	ERD25FJ560	Carbon	56 ohms 1/4W
R105	ERD25FJ561	Carbon	560 ohms 1/4W
R106	ERD25TJ103	Carbon	10K ohms 1/4W
R107	ERD25FJ562	Carbon	5.6K ohms 1/4W
R108,109	ERD25FJ561	Carbon	560 ohms 1/4W
R110	ERD25FJ273	Carbon	27K ohms 1/4W
R111-113	ERD25FJ102	Carbon	1K ohms 1/4W
R114	ERD25FJ333	Carbon	33K ohms 1/4W
R115	ERD25FJ102	Carbon	1K ohms 1/4W
R116,117	ERD25TJ103	Carbon	10K ohms 1/4W
R118	ERD25FJ223	Carbon	22K ohms 1/4W
R119	ERD25FJ472	Carbon	4.7K ohms 1/4W
R120	ERD25TJ103	Carbon	10K ohms 1/4W
VR1,2	YCVRJ6PK103B	Variable Resistor	10K ohms
VR3	EWKE1AS15A23	Variable Resistor	2K ohms
C1	ECEA1CN330S	Electrolytic	33 µF 16V
C2	ECEA1AS470	Electrolytic	47 µF 10V

SYM-BOL NO.	PART NO.	DESCRIPTION	
C3,4	ECEA1CSS100	Electrolytic	10 µF 16V
C5	ECQM1H103KZ	Plastic	0.01 µF 50V
C6	ECEA1AS101	Electrolytic	100 µF 10V
C7	ECEA1ES4R7	Electrolytic	4.7 µF 25V
C8	ECCF1H470JC	Ceramic	47 pF 50V
C9	ECCF1H151JR	Ceramic	150 pF 50V
C10	ECQM1H103KZ	Plastic	0.01 µF 50V
C11	ECCF1H820JC	Ceramic	82 pF 50V
C12	ECEA1CSS100	Electrolytic	10 µF 16V
C13	ECQM1H393KZ	Plastic	0.039 µF 50V
C14,15	ECQM1H333KZ	Plastic	0.033 µF 50V
C16	ECCF1H101JC	Ceramic	100 pF 50V
C19	ECCF1H470JC	Ceramic	47 pF 50V
C20	ECEA1AS221	Electrolytic	220 µF 10V
C21	ECCF1H820JC	Ceramic	82 pF 50V
C22	ECCF1H100DC	Ceramic	10 pF 50V
C23	ECCF1H101JC	Ceramic	100 pF 50V
C24	ECQS1182JZ	Plastic	1800 pF 125V
C25	ECQS1122JZ	Plastic	1200 pF 125V
C26	ECQS1821JZ	Plastic	820 pF 125V
C27	ECEA1CSS100	Electrolytic	10 µF 16V
C28	ECQM1H103KZ	Plastic	0.01 µF 50V
C29	ECEA1CS470	Electrolytic	47 µF 16V
C30	ECQM1H102KZ	Plastic	1000 pF 50V
C31	ECCF1H680JC	Ceramic	68 pF 50V
C32	ECQM1H103KZ	Plastic	0.01 µF 50V
C33	ECCF1H560JC	Ceramic	56 pF 50V
C34	ECQM1H103KZ	Plastic	0.01 µF 50V
C35	ECQS1122JZ	Plastic	1200 pF 125V
C36	ECQS1821JZ	Plastic	820 pF 125V
C40	ECEA1CS101	Electrolytic	100 µF 16V
C42	ECEA0JSS471	Electrolytic	470 µF 6.3V
C43	ECCF1H100DC	Ceramic	10 pF 50V
C44	ECEA0JSS471	Electrolytic	470 µF 6.3V
C45	ECCF1H100DC	Ceramic	10 pF 50V
C46,48	ECEA0JSS471	Electrolytic	470 µ 6.3V
C50	ECEA0JSS471	Electrolytic	470 µ 6.3V
C51	ECCF1H100DC	Ceramic	10 pF 50V
C52	ECEA0JSS471	Electrolytic	470 µF 6.3V
C54	ECEA1HN010S	Electrolytic	1 µF 50V
C55	ECQM1H102KZ	Plastic	1000 pF 50V
C57	ECCF1H181JC	Ceramic	180 pF 50V
C60	ECEA1CS101	Electrolytic	100 µF 16V
C61-63	ECSF1CE476	Electrolytic	47 µF 16V
C64	ECEA1CSS221	Electrolytic	220 µF 16V
C66	ECCF1H330JC	Ceramic	33 pF 50V
C67	ECCF1H220JC	Ceramic	22 pF 50V
C68	ECCF1H820JC	Ceramic	82 pF 50V
C69	ECQM1H103KZ	Plastic	0.01 µF 50V
C70	ECCF1H271JC	Ceramic	270 pF 50V
VC1,2	ECV1ZW50X32	Trimmer Capacitor	50 pF
VC3	ECV1ZW25X53T	Trimmer Capacitor	25 pF
L1,2	YWLS-7150J	Coil	15 µH
L3	YSP0406L4R7K	Coil	4.7 µH
L4	YWLS-7470J	Coil	47 µH
X1	YWHC6U2R5M	Crystal Oscillator	
X2	YWHC18U8R8M	Crystal Oscillator	
CN1	YWIC4914062	IC Socket	
M37	YWV8310HM02	Handle for Circuit Board	

MOTHER BOARD

SYMBOL NO.		PART NO.	DESCRIPTION	
PCB10		○ YFJKZ4600EAA	Printed Circuit Board Assy	
IC1	⚠	HA17723G	IC	
TR1	⚠	2SC1226A-PTR	Transistor	
TR2-5		2SD636-RS	Transistor	
D1	⚠	ERC81-004	Diode	
R1		ERD25FJ471	Carbon	470 ohms 1/4W
R2		ER025CKF2700	Metal	270 ohms 1/4W
R3		ER025CKF1501	Metal	1.5K ohms 1/4W
R4		ERD25FJ102	Carbon	1K ohms 1/4W
R5		ERD25FJ332	Carbon	3.3K ohms 1/4W
R6		ERD10FJ333	Carbon	33K ohms 1/8W
R7,8		ERD10FJ472	Carbon	4.7K ohms 1/8W
R9		ERD10FJ103	Carbon	10K ohms 1/8W
R10		ERD10FJ391	Carbon	390 ohms 1/8W
R11		ERD10FJ331	Carbon	330 ohms 1/8W
R12		ERD10FJ332	Carbon	3.3K ohms 1/8W
R13		ERD10FJ333	Carbon	33K ohms 1/8W
R14		ERD10FJ393	Carbon	39K ohms 1/8W
R15		ERG1ANJ221	Metal	220 ohms 1W
R16		ERD10FJ102	Carbon	1K ohms 1/8W
R17		ERD25FJ680	Carbon	68 ohms 1/4W
R18		ERX2ANJR33	Metal	0.33 ohms 2W
R19		ERD25FJ561	Carbon	560 ohms 1/4W
R20		ERD10FJ103	Carbon	10K ohms 1/8W
R21,22		ERD10TJ562	Carbon	5.6K ohms 1/8W
R23		ERD10TJ104	Carbon	100K ohms 1/8W
VR1		YFP0T3321P52	Variable Resistor	500 ohms
C2		ECQP1221JZ	Plastic	220 pF 100V
C3		ECET25R472SW	Electrolytic	4700 μF 25V
C4		ECSF1VE105	Tantalum	1 μF 35V
C5		ECSF1EE335	Tantalum	33 μF 25V
C6		ECEB1CS471	Electrolytic	470 μF 16V
C7		ECEA1AS102	Electrolytic	1000 μF 10V
C8		ECEA1CN100S	Electrolytic	10 μF 16V
C10		ECKF1H472KB	Ceramic	4700 pF
C11-13		ECEA1CN100S	Electrolytic	10 μF 16V
T1		YWDP42-6015	Transformer	
CN2-JM		YF527106A	6 pin Jack Male	
CN3-JM		YF527106A	6 pin Jack Male	
CN4-JM		YF527110A	10 pin Jack Male	
CN5-JM		YF527106A	6 pin Jack Male	
CN6-JM		YF527106A	6 pin Jack Male	
CN7-JM		YF527110A	10 pin Jack Male	
CN8-JM		YFB5B-XH-A	5 pin Jack Male	
CN9-JM		YFB4B-XH-A	4 pin Jack Male	
CN10-JM		YFS4B-XH-A	4 pin Jack Male	
CN11-JM		YFB5B-XH-A	5 pin Jack Male	
CN12 -JM		YFS3B-XH-A	3 pin Jack Male	
CN13-JM		YFB2B-XH-A	2 pin Jack Male	
CN14-23		YFR412238A	22 pin Connector	
E10		WMT6X1R2X7	Insulator	
E12		YWSN5053	Fuse Holder	
E13		YFR412091A	22 pin Connector pin	

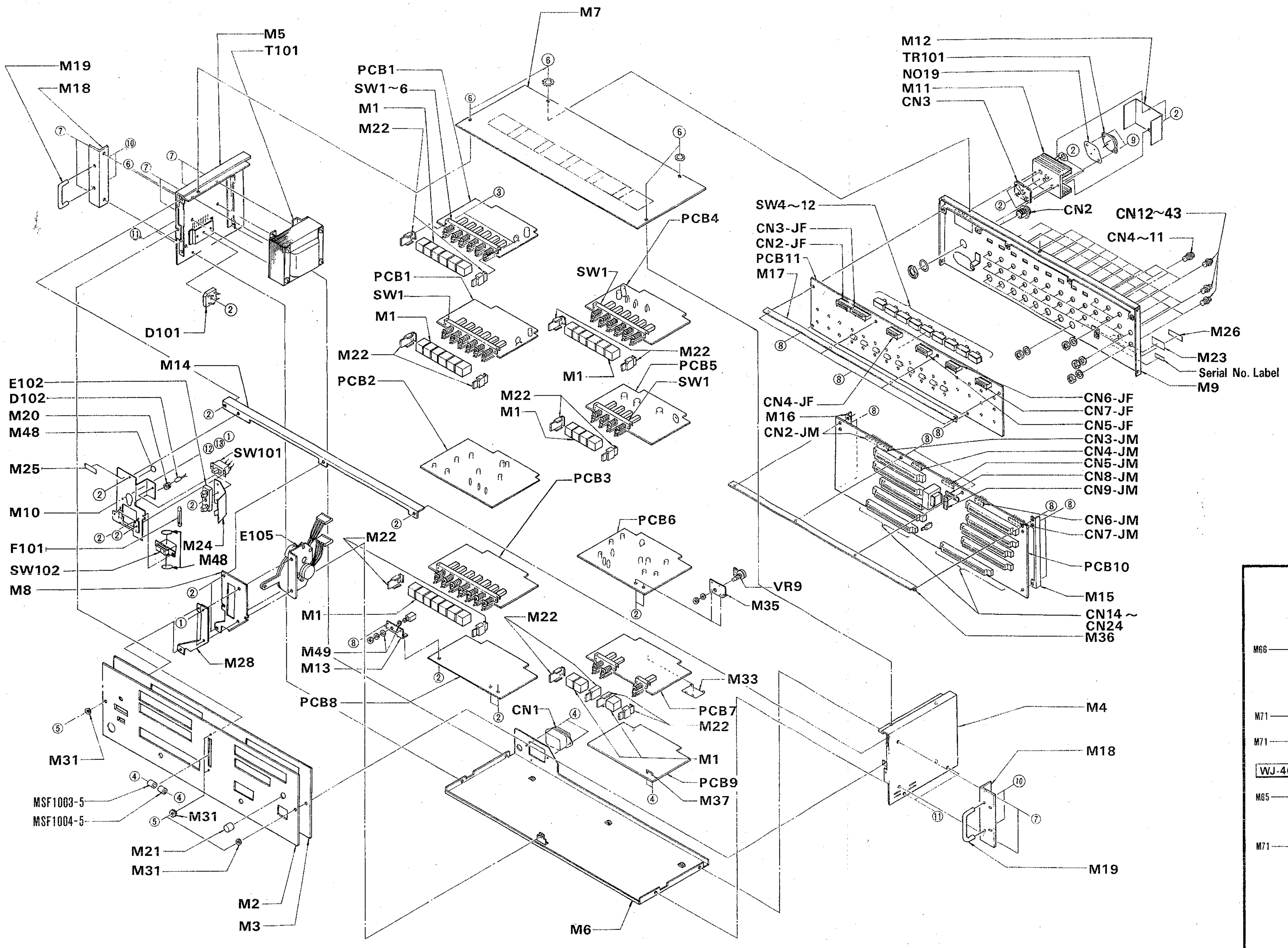
CONNECTION BOARD

SYMBOL NO.	PART NO.	DESCRIPTION	
PCB11	○ YFJKZ4600EBA	Printed Circuit Board Assy	
TR7	2SC828AR	Transistor	
TR8	2SC1318-RS	Transistor	
TR9	2SC828AR	Transistor	
TR10	2SC1318-RS	Transistor	
TR11	2SC828AR	Transistor	
TR12	2SC1318-RS	Transistor	
TR13	2SC828AR	Transistor	
TR14	2SC1318-RS	Transistor	
TR15	2SC828AR	Transistor	
TR16	2SC1318-RS	Transistor	
TR17	2SC828AR	Transistor	
TR18	2SC1318-RS	Transistor	
TR19,20	2SC828AR	Transistor	
TR21	2SC1318-RS	Transistor	
TR22	2SC828AR	Transistor	
TR23,24	2SC1318-RS	Transistor	
TR25-27	2SC828AR	Transistor	
TR28	2SC1318-RS	Transistor	
R16	ERD25FJ750	Carbon	75 ohms 1/4W
R17	ERD25FJ333	Carbon	33K ohms 1/4W
R18	ERD25FJ183	Carbon	18K ohms 1/4W
R19	ERD25FJ221	Carbon	220 ohms 1/4W
R20	ERD25FJ152	Carbon	1.5K ohms 1/4W
R21	ERD25FJ750	Carbon	75 ohms 1/4W
R22	ERD25FJ333	Carbon	33K ohms 1/4W
R23	ERD25FJ183	Carbon	18K ohms 1/4W
R24	ERD25FJ221	Carbon	220 ohms 1/4W
R25	ERD25FJ152	Carbon	1.5K ohms 1/4W
R26	ERD25FJ750	Carbon	75 ohms 1/4W
R27	ERD25FJ333	Carbon	33K ohms 1/4W
R28	ERD25FJ183	Carbon	18K ohms 1/4W
R29	ERD25FJ221	Carbon	220 ohms 1/4W
R30	ERD25FJ152	Carbon	1.5K ohms 1/4W
R31	ERD25FJ750	Carbon	75 ohms 1/4W
R32	ERD25FJ333	Carbon	33K ohms 1/4W
R33	ERD25FJ183	Carbon	18K ohms 1/4W
R34	ERD25FJ221	Carbon	220 ohms 1/4W
R35	ERD25FJ152	Carbon	1.5K ohms 1/4W
R36	ERD25FJ750	Carbon	75 ohms 1/4W
R37	ERD25FJ333	Carbon	33K ohms 1/4W
R38	ERD25FJ183	Carbon	18K ohms 1/4W
R39	ERD25FJ221	Carbon	220 ohms 1/4W
R40	ERD25FJ152	Carbon	1.5K ohms 1/4W
R41	ERD25FJ750	Carbon	75 ohms 1/4W
R42	ERD25FJ333	Carbon	33K ohms 1/4W
R43	ERD25FJ183	Carbon	18K ohms 1/4W
R44	ERD25FJ221	Carbon	220 ohms 1/4W
R45	ERD25FJ152	Carbon	1.5K ohms 1/4W
R46	ERD25FJ750	Carbon	75 ohms 1/4W
R47,48	ERD25FJ183	Carbon	18K ohms 1/4W
R49	ERD25FJ221	Carbon	220 ohms 1/4W
R50	ERD25FJ152	Carbon	1.5K ohms 1/4W
R51	ERD25FJ750	Carbon	75 ohms 1/4W
R52,53	ERD25FJ183	Carbon	18K ohms 1/4W
R54	ERD25FJ221	Carbon	220 ohms 1/4W
R55	ERD25FJ152	Carbon	1.5K ohms 1/4W
R56	ERD25FJ750	Carbon	75 ohms 1/4W
R57	ERD25FJ333	Carbon	33K ohms 1/4W
R58	ERD25FJ183	Carbon	18K ohms 1/4W
R59	FRD25FJ221	Carbon	220 ohms 1/4W
R60	ERD25FJ152	Carbon	1.5K ohms 1/4W
R67	ERD25FJ103	Carbon	10K ohms 1/4W
R68	ERD25FJ104	Carbon	100K ohms 1/4W
R69	ERD25FJ103	Carbon	10K ohms 1/4W
R70	ERD25FJ104	Carbon	100K ohms 1/4W
R71	ERD25FJ103	Carbon	10K ohms 1/4W
R72	ERD25FJ104	Carbon	100K ohms 1/4W
R73	ERD25FJ103	Carbon	10K ohms 1/4W
R74	ERD25FJ104	Carbon	100K ohms 1/4W
R75	ERD25FJ103	Carbon	10K ohms 1/4W
R76	ERD25FJ104	Carbon	100K ohms 1/4W
R77	ERD25FJ103	Carbon	10K ohms 1/4W
R78	ERD25FJ104	Carbon	100K ohms 1/4W
R79	ERD25FJ103	Carbon	10K ohms 1/4W
R80	ERD25FJ104	Carbon	100K ohms 1/4W
R81-84	ERD25FJ750	Carbon	75 ohms 1/4W
R85-90	ERD25FJ680	Carbon	68 ohms 1/4W
R91	ERD25FJ103	Carbon	10K ohms 1/4W
R92	ERD25FJ104	Carbon	100K ohms 1/4W
R93	ERD10FJ152	Carbon	1.5K ohms 1/8W
R94	ERD10FJ561	Carbon	560 ohms 1/8W
R95	ERD10FJ222	Carbon	2.2K ohms 1/8W
R96	ERD10FJ680	Carbon	68 ohms 1/8W
R97	ERD10FJ122	Carbon	1.2K ohms 1/8W
R98	ERD10FJ202	Carbon	2K ohms 1/8W
R99	ERD10FJ222	Carbon	2.2K ohms 1/8W
R100	ERD10FJ273	Carbon	27K ohms 1/8W
R101	ERD10FJ103	Carbon	10K ohms 1/8W
R102	ERD10FJ561	Carbon	560 ohms 1/8W
R103	ERD10FJ471	Carbon	470 ohms 1/8W
R104	ERD10FJ102	Carbon	1K ohms 1/8W
R105	ERD10FJ561	Carbon	560 ohms 1/8W
R106	ERD10FJ272	Carbon	2.7K ohms 1/8W
R107	ERD10FJ821	Carbon	820 ohms 1/8W
R108	ERD10FJ471	Carbon	470 ohms 1/8W
R109	ERD10FJ332	Carbon	3.3K ohms 1/8W
R110	ERD10FJ222	Carbon	2.2K ohms 1/8W
R111	ERD10FJ560	Carbon	56 ohms 1/8W
R112	ERD10FJ181	Carbon	180 ohms 1/8W
R113-115	ERD25FJ750	Carbon	75 ohms 1/4W
R116	ERD25FJ680	Carbon	68K ohms 1/4W
C4-12	ECEB1AS470	Electrolytic	47 μF 10V
C13	ECEA1CK100	Electrolytic	10 μF 16V
C14	ECEB1CS100	Electrolytic	10 μF 16V
C16	ECEA0JK101	Electrolytic	100 μF 6.3V
C17	ECEA1AK470	Electrolytic	47 μF 10V
C18-20	ECEA0JSS471	Electrolytic	470 μF 6.3V
SW4-12	YWSSC-322A	Slide Switch	
E14	YVL437TM027	Terminal Pin	
CN2,3	YW5145-6CH	6pin Jack Male	
CN4	YW5145-10CH	10pin Jack Male	
CN5,6	YW5145-6CH	6pin Jack Male	
CN7	YW5145-10CH	10pin Jack Male	

ACCESSORY PARTS/PACKAGING PARTS

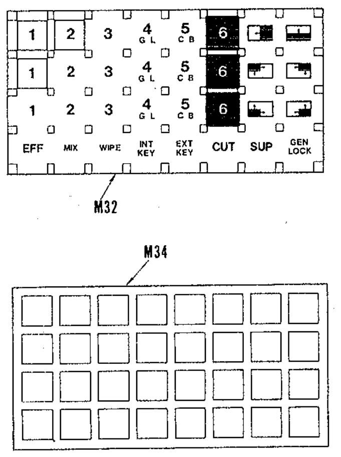
SYMBOL NO.	PART NO.	DESCRIPTION
PCB15	YWJ5500ZK13	Extension Board Assy
CN101	YFCNR-1204P	4 pin Connector (x8)
CN102	YWRM12BPG4S	4 pin DC Connector
PL101	YW6200120500	Lamp (x2)
M18	YWV8250AM20	Rack Mounting Angle (x2)
M19	YWB350-HM01	Rack Mounting Handle (x2)
M34	YWJ5500UR02	Expression Card B for Switch
M61	YFV8QA0723AN	Operating Instruction
M62	19998700331	Warranty Card for WJ-4600C/B
M65	XZB45X63C05	Polyethylene Bag for SEG
M66	XZB26X40C05	Polyethylene Bag for Printed Matters
M67	YWT20X35C03	Polyethylene Bag for Power Cord
M68	YWT15X20C03	Polyethylene Bag for Extension board
M69	YWT10X10C03	Polyethylene Bag for Connector
M70	YWT050803	Polyethylene Bag for Lamp
M71	○ YFV9CA0552AN	Packaging

EXPLODED VIEW OF SPECIAL EFFECTS GENERATOR/PACKAGING

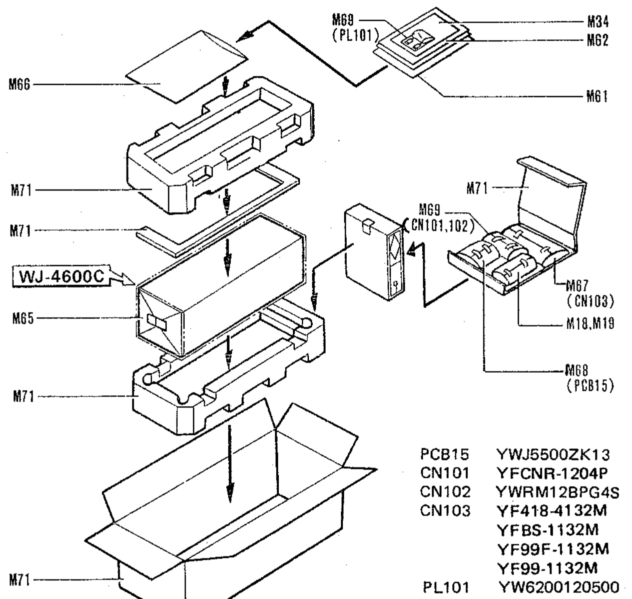

M7
M5
T101
M19
M18
PCB1
SW1~6
M1
M22
PCB4
PCB1
SW1
M1
M22
PCB2
SW1
M22
PCB5
M1
SW1
M22
M1
D101
M14
E102
D102
M20
M48
M25
M10
F101
SW102
M8
SW101
E105
M24
M48
M22
PCB3
PCB6
VR9
M35
M1
M49
M13
M22
M28
PCB8
CN1
M33
PCB7
M22
M1
PCB9
M37
M31
MSF1003-5
MSF1004-5
M31
M21
M31
M2
M3
M6
M12
TR101
NO19
M11
CN3
SW4~12
CN3-JF
CN2-JF
PCB11
M17
CN2
CN12~43
CN4~11
M26
M23
Serial No. Label
M9
CN4-JF
M16
CN2-JM
CN6-JF
CN7-JF
CN5-JF
CN3-JM
CN4-JM
CN5-JM
CN8-JM
CN9-JM
CN6-JM
CN7-JM
PCB10
M15
CN14~CN24
M36
M4
M18
M19

◯Numbers Show Screws

No.	Screw	Description
①	XSB4+6FX	Binding Head Screws
②	XSB3+6FX	Binding Head Screws
③	XSB3+4FX	Binding Head Screws
④	XSB26+6FX	Binding Head Screws
⑤	XSB3+6FN	Binding Head Screws
⑥	XSB3+6FXK	Binding Head Black Screws
⑦	XSB4+6FXK	Binding Head Black Screws
⑧	XTB3+6FX	Binding Head Tapping Screws
⑨	XSB3+12BN	Binding Head Screws
⑩	XSS4+6FXN	Flush Head Machine Screws
⑪	XSB3+8FXK	Binding Head Black Screws
⑫	XWC4BFN	External Toothed Lock Washer
⑬	ϕ4 Lag	Earth Lag


1
2
3
4
GL
5
CB
6
EFF
MIX
WIPE
INT KEY
EXT KEY
CUT
SUP
GEN LOCK
M32
M34

PACKAGING


M69
(PL101)
M34
M62
M61
M66
M71
M71
WJ-4600C
M65
M71
M71
M71
M69
(CN101,102)
M67
(CN103)
M18,M19
M68
(PCB15)

PCB1	Video Crosspoint-1 Board
PCB2	Wipe/Mix/Key Board
PCB3	Video Crosspoint-2 Board
PCB4	Waveform Generator Board
PCB5	Waveform Processor Board
PCB6	Preview/Effect Output Board
PCB7	Program Output Board
PCB8	Subcarrier Board
PCB9	Sync Generator Board
PCB10	Mother Board
PCB11	Connection Board
TR101	2SA837-PQ
D101	S10VB20
D102	LN21
VR101,102	EVSY2SA20B23
T101	YFPHE76V022
SW101	ESD391T
SW102	EST1554
SW103-106	YWMSS-5-2
F1	XBA2C31ET0A
F101	XBA2C031ET0A
CN1	YFCM3
CN2	YWRM12BRD-4P
CN3	YWS2-104W1S0
CN4-11	YFCNR-1204J
CN12-43	YWBNC-R
E1	YWX-N1153-07
E105	YWMSF1000-4A
M1	YWFL-BUTTON
M2	YFV5WC0185A2
M3	YFV6GA0024A2
M4	YFV5EA0257A3
M5	YFV5EA0254A3
M6	YFV5EA0255A2
M7	YWJ5500KM01A
M8	YWJ4600CM04
M9	YFV5WB0186A2
M10	YFV2SA0149A4
M11	YVSQ0170AM2A
M12	YFV5EA0256A4
M13	YWJ4600AM03
M14	YWJ4600AM05A
M15	YWJ4600AM06
M16	FWJ4600AM07
M17	YFV2SA0148A4
M18	YWV8250AM20
M19	YWB350HM01
M20	YWJ800PWB01
M21	YWUM50-HM01B
M22	YWJ5500FR02B
M23	YFV7QA0703A4
M24	YFV2PA0069A4
M25	YFV7MA0142A4
M26	YFV7MB0099A4
M28	YFV2SA0161A4
M30	YFV7MA0125A4
M31	YWL3X6BER01
M32	YFV7SA0217A4
M33	YWJ4600AM08
M34	YWJ5500UR02
M36	YWJ5500AM03
M37	YWV8310HM02
M48	YW-BCG-UR01B
M49	YWA620AER01

PCB15	YWJ5500ZK13
CN101	YFCNR-1204P
CN102	YWRM12BPG4S
CN103	YF418-4132M YFBS-1132M YF99F-1132M YF99-1132M
PL101	YW6200120500
M18	YWV8250AM20
M19	YWB350-HM01
M34	YWJ5500UR02
M61	YFV8QA0723AN
M62	'19998700331
M65	XZB45X63C05
M66	XZB26X40C05
M67	YWT20X35C03
M68	YWT15X20C03
M69	YWT10X10C03
M70	YWT050803
M71	YFV9CA0552AN